2009
Marine Cargo Forecast

Technical Report

Prepared for

Washington Public Ports Association
and
Washington State
Department of Transportation

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March 23, 2009

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Executive Summary

Overview

Washington sits astride a great international trade route. This valuable resource links our state to the world's economy. The investments we have made to maintain and strengthen this asset pay substantial dividends in terms of supply-chain efficiencies, shipping rates and access to emerging markets. In concert with the state's transportation system, our ports provide:

- Family wage jobs, especially in industrial and agricultural sectors.
- Transport of commercial goods at substantially reduced cost.
- Cost-effective access to global markets.

The purpose of the *2009 Marine Cargo Forecast* is to assess the expected flow of waterborne cargo through Washington's port system and to evaluate the distribution of cargo through the state's transportation network, including waterways, rail lines, roads, and pipelines. The study includes forecasts of trade opportunities by commodity and cargo type during the period beginning in 2008 and ending in 2030.

The forecasts are unconstrained, which means they do not consider limitations in infrastructure such as rail lines or roads. However, they do provide a qualitative assessment of these factors because meeting demand will inevitably require upgrades and investment, particularly in rail capacity.

Since 1985, the Washington Public Ports Association (WPPA) and Washington State Department of Transportation (WSDOT) have jointly conducted periodic cargo forecasts and performance assessments of the state's marine port transportation system. These reports are used as planning tools within the port community and related industries. They also alert state and local policymakers, as well as the public, to potential opportunities and constraints.

Previous versions of this study have been conservative or close to accurate across all cargo types. Container volumes for 2007, for instance, were within 3% to 4% of the 1995, 1999, and 2004 forecasts – an impressive degree of accuracy by almost any standard.

Economic opportunities on the Pacific Rim

The first section of the report assesses the prospects for the world economy with an emphasis on the state's principal trading partners in Asia. The state's dependence on Asia is difficult to overstate. Consider the following:

- 97 percent of containers imported to Washington come from Asia.
- 90 percent of containers exported from the state go to Asia.

This report analyzes each region or country to identify factors impacting those areas in the short term. That information is used to make long-term projections, and to inform cargo forecasts up to the year 2030. While economic recovery in the Pacific Rim is expected to remain depressed in the short term, trade will recover.

China is especially critical to Washington, as it is to other West Coast states. For many commodities, its importance has surpassed all other Asian countries. China's economy is expected to continue growing and will be second only to the United States as a global economic power by the year 2018.

Washington's chief domestic trading partners – Alaska and Hawaii – are also included in the macroeconomic overview section of the report. Alaska's economy is driven by the petroleum industry and the federal government. Hawaii's is led by the tourism industry, but has a more diversified economy than Alaska. Both states are projected to grow slowly during the forecast period.

Trade opportunities in the Evergreen State

Washington State's public ports have experienced strong and steady growth during the past quarter of a century. For example, Washington ports have shown the following increases since 1982:

- Cargo volumes handled by longshore workers have tripled.
- Containerized cargo has increased fivefold.
- All cargo types have shown substantial gains, with the exception of timber.

Robust growth opportunities remain. The state's waterborne commerce is expected to expand at an average annual rate of 1.7% per year through 2030. Although growth will vary by commodity, there will be opportunities within all cargo groups. Highlights of the forecast include the following:

Containers are still the fastest growing cargo type. Although growth opportunities remain positive, our ports face substantial competition. Container traffic grew from nearly 2.9 million TEUs[1] in 2002 to nearly 3.9 million in 2007. Puget Sound containerized trade is projected to grow by an average of 4.1 percent per year in the forecast period, reaching 9.7 million TEUs in 2030.

Fully assembled autos will exhibit rapid growth. Auto imports are expected to grow rapidly to approximately 1.5 million units in 2030, up from 690,000 units in 2007. Competitive rail service will be essential to meeting this demand as three quarters of auto imports currently move to inland locations by rail.

Log exports will level off. After decades of decline, log exports are expected to level off and remain flat through the forecast period. The loss of log exports has affected many ports, which have responded with successful diversification programs. Many have found niche opportunities, such as wind energy equipment.

Breakbulk cargo volumes will grow slowly. Metal, forest products and other breakbulk cargo will grow slowly due to containerization and structural changes in the industries that produce these cargoes. Much of the expansion will occur as ports diversify. As a result, breakbulk traffic through Washington ports is projected to grow from 2.3 million metric tons in 2007 to around 3.0 million metric tons in 2030.

Grain shipments will expand. After increasing substantially in recent years, grain shipments will grow modestly in the face of significant domestic and international competition.

[1] Twenty-foot Equivalent Units (TEU): one TEU represents the cargo capacity of a standard shipping container 20 feet long and 8 feet wide.

Dry bulk trends will continue. Some stalwart cargoes (such as alumina) have decreased while others (such as petroleum coke) have increased. These trends will continue.

Liquid bulk will shift from domestic to foreign. Both crude oil and petroleum products will shift from domestic to foreign sources as Alaskan production tapers off.

Transportation: moving goods to market over road, rail and water

An efficient transportation system that integrates road, rail and waterway transportation is essential to meeting our state's present and future trade opportunities. The report looks in depth at each of these modes, identifies their current state and lists projects that will be critical to meeting the state's future capacity needs.

Road

Road, highway, and on-terminal truck transport is critical to Washington's ports. Heavy, mid, and light trucks play important roles in cargo movement and goods distribution. Trucks overall comprise a relatively small portion of total road and highway traffic in the urban regions of the state. While truck traffic is expected to grow between now and 2030, auto traffic will increase even faster. In light of this competition for scarce resources, the challenge will be to protect the functionality and reliability of the system for truck transport. Road capacity development will be critical for continued economic growth.

Rail

Trade prosperity in our state is directly linked to the level of rail capacity serving our ports. About 40 percent of the state's rail traffic is related to port activity. The amount of cargo moving to our ports by rail is forecast to increase from the current 42 million tons to 65 million tons in 2030. The state's ability to meet this opportunity will depend on the investments state leaders make to expand and improve rail operations and infrastructure.

The state rail system consists of the mainline system and several short-line operations. The mainline system is the primary inland transportation component for large-volume import and export cargo moving through our ports. The short-line network consists of many small local railroads, many of which evolved as the state's rail network experienced system-wide contractions, and low-density feeder lines were abandoned by mainline operators.

Washington's mainline rail system is comprised of two competing railroads: the Burlington Northern Santa Fe (BNSF) and the Union Pacific (UP). Both operators have invested in improvements and upgrades to their mainline systems, including new locomotives, new traffic control systems and substantial mainline rail bed improvements.

In general, the key mainlines are able to accommodate existing levels of traffic, but are experiencing capacity limitations during peak traffic conditions. Infrastructure improvements and operational changes will be needed to accommodate projected growth in freight and passenger traffic, and to keep the state's mainline rail services competitive. The report includes a review of recent rail system enhancements and provides a complete description of mainline routes, including the north-south corridor along I-5, and the east-west routes along the Columbia River and over the Cascades.

The following projects, reviewed in detail in this report, have the highest priority and should be undertaken within the next eight years (by 2017):

- Vancouver, Washington Freight Rail Bypass.
- Point Defiance Bypass from Tacoma to Nisqually.
- Partial third main line from Kalama to Kelso.
- Port of Vancouver USA West Freight Access Project.
- Siding extensions at Mount Vernon and Stanwood, new siding at Swift.
- Blakeslee Junction at Centralia.
- High Speed Crossover Plan from Nisqually to Centralia.
- East Marginal Way Grade Separation and Duwamish Rail Corridor at Seattle.
- Bullfrog Junction Realignment at Tacoma.

Additionally, several major projects should also be considered in the long term, including the following:

- Construction of a third line to the full extent between Martin's Bluff and Rocky Point along the Kelso-Vancouver (WA) route.
- Clearing of Stampede Pass to accommodate double-stack rail cars.
- Construction of an Ellensburg-Lind "cutoff" along the old Milwaukee Road corridor.
- Completion of the "Bridging the Valley" project between Spokane and Athol, Idaho.

Waterways

In addition to road and rail transportation, our state's waterways are critically important to international and domestic trade. The Columbia-Snake River navigation system allows Washington-grown agricultural products to move from farm to market, and provides price competition between modes of transportation. Puget Sound and the Washington Coast are vital to domestic barge trade as well as international trade.

The Columbia River deepening project will significantly benefit Washington and Oregon ports along the Lower Columbia by creating transportation cost savings and reducing transit times of larger ocean vessels now in service. This final piece of the long-delayed deepening of Lower Columbia ship channel is about to be completed.

From harbors in Puget Sound to dams on the Snake River, our waterways are integral to Washington's economy. Future challenges related to channel deepening, maintenance dredging and potential dam breaching must be addressed to preserve the viability of the system.

Challenges on the horizon

Washington's public ports provide economic security, opportunity and diversity to our local communities, to the state as a whole, and to the surrounding region. If we invest wisely in transportation and port infrastructure, trade will continue to flow through the state and deliver tremendous opportunity in the next two decades and beyond.

Every ship that calls in Washington provides greater choices and better prices for consumers, but it also creates opportunities for all Washingtonians: farmers who must move their crops to markets overseas; manufacturers who rely on inbound shipments for parts and materials; and countless innovators who ship their high-demand products cheaply and efficiently around the world.

Our ability to cultivate new opportunities will depend on the investments made today and tomorrow. Although Washington has many assets – rich farm land, intellectual capital, a quality work force – the cargo we send to the global marketplace is discretionary. It can move through alternative gateways, so we must compete aggressively to ensure our trade route is preserved.

Competition is especially fierce from ports in Southern California and Western Canada. Southern California is especially attractive to shippers because its large population base forms one of the planet's greatest retail marketplaces. Canada's government increased the competitiveness of its ports with a multi-billion dollar effort to attract trade with Asia, improving the Port of Prince Rupert and Port Metro Vancouver, as well as rail infrastructure between Canada's West Coast and the U.S. Midwest.

Other factors threaten our state's discretionary trade. For example, when the Panama Canal expansion is completed in 2014, the route's vessel capacity will double. This will allow more ships to bypass the West Coast entirely, choosing instead to take their cargo directly to East Coast ports in closer proximity to major U.S. population centers.

The key to maintaining and expanding our place in the global economy is to continue investing in our trade route – beginning with an efficient, cost-effective rail system. Our state's participation in trade brings with it thousands of jobs and greater collective wealth, but it also requires investment. If we make wise choices now, our state stands to benefit from the growth on the horizon for Washington's port transportation system.

Chapter 1
International Macroeconomic Overview

Introduction

The following chapter summarizes economic forecasts for the trading regions that are important to Washington State ports, based on research conducted by IHS Global Insight. As demonstrated below, Asia is the most important trading region for Washington State ports, and because of this the majority of this chapter examines economic trends in Asia.

Waterborne data from a number of different sources indicate that relatively few other countries or regions are major waterborne trading partners of the Pacific Northwest (PNW). As shown in Table 1-1, all but 2.8 percent of containerized imports and 10.6 percent of containerized exports are related to trade with Asia.

Table 1-1: Share of PNW International Containerized Trade
2008 (Full International TEU)

Direction	China	Other Northeast Asia	South/ Southeast Asia	Other	Total
Imports	66.8%	19.9%	10.5%	2.8%	100%
Exports	19.6%	53.3%	16.4%	10.6%	100%
Total	47.1%	33.9%	13.0%	6.1%	100%

"TEU" – Twenty-foot Equivalent Unit
Source: BST Associates using PIERS data

The Pacific Northwest also ships substantial volumes of non-containerized exports to Asia, but receives very limited volumes of non-containerized imports from Asia. As shown in Table 1-2, in terms of non-containerized tonnage, in 2007 Asia accounted for 88 percent of Pacific Northwest waterborne exports, with Northeast Asia receiving the largest share. All Asian countries combined accounted for just 20 percent of non-containerized import tonnage. The largest single source of non-containerized imports is Canada, and most of this is made up of limestone and other building materials. Other major sources of non-containerized imports include Mexico, Saudi Arabia, and Australia.

Table 1-2: Share of PNW Non-Containerized Trade
2007 (Based on Metric Tons)

Direction	China	Other Northeast Asia	South/ Southeast Asia	Other	Total
Imports	7.3%	10.9%	1.7%	80.0%	100%
Exports	30.1%	45.5%	12.5%	11.9%	100%
Total	24.0%	36.2%	9.6%	30.1%	100%

Source: BST Associates using PIERS data

Growth in the Importance of China

The growth in China's economy has been the big story in international trade over the past decade, and, for many commodity types, the importance of China to West Coast ports has surpassed that of the rest of Asia. China's economy is expected to continue to grow, and is expected to

overtake nearly every other country in the next ten years. Only the economy of the U.S. is projected to be larger than that of China by 2018.

As shown in Table 1-3, in 1998 China's economy was the seventh largest in the world, with total Gross Domestic Product (GDP) less than that of the traditional developed countries (Japan and Western Europe). IHS Global Insight has projected that when the GDP figures for 2008 are compiled only the U.S. and Japan will have economies larger than China's, and by 2018 Japan's will fall behind China's.

Table 1-3: Country GDP Rank: Top Ten in Each Year In Real U.S. Dollar Terms

1998	2008	2018	2038
U.S.	U.S.	U.S.	U.S.
Japan	Japan	China	China
Germany	China	Japan	India
U.K.	Germany	Germany	Japan
France	U.K.	U.K.	Germany
Italy	France	France	U.K.
China	Italy	India	France
Canada	Spain	Italy	Brazil
Spain	Canada	Canada	Italy
Brazil	India	Brazil	Russia

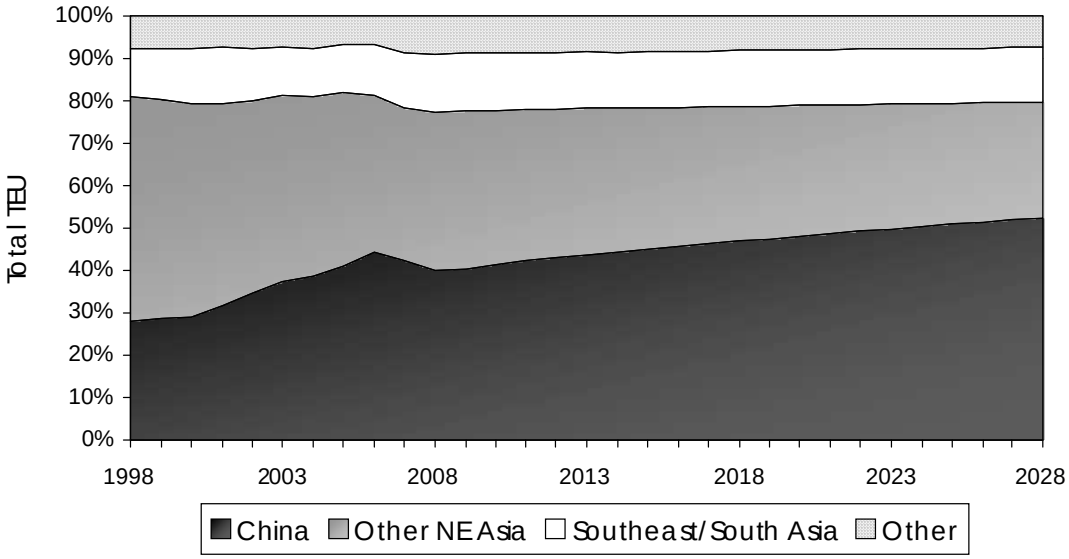
Source: IHS Global Insight

India's economy is also expected to grow substantially over the next three decades. In 1998 India did not rank in the top ten economies worldwide in terms of GDP. When year-end figures are compiled for 2008, IHS Global Insight expects that India will become the tenth largest economy. By 2018 India's rank is projected to jump to number seven, and by 2038 is projected to be the world's third largest, following the U.S. and China.

Containers

Japan and the rest of Northeast Asia (excluding China) has traditionally been the largest container-trading partner for North Pacific ports. As shown in Figure 1-1, in 2000 Northeast Asia accounted for more than 40 percent of international full container trade at North Pacific ports. (Note: IHS Global Insight defines the "North Pacific" port region to include Oregon, Washington, and Alaska ports.) In that same year, China (i.e., China and Hong Kong combined) accounted for 20 percent and South/Southeast Asia 23 percent of TEU volume at North Pacific ports.

Figure 1-1: Share of International Container Trade
North Pacific Ports (Washington and Oregon)

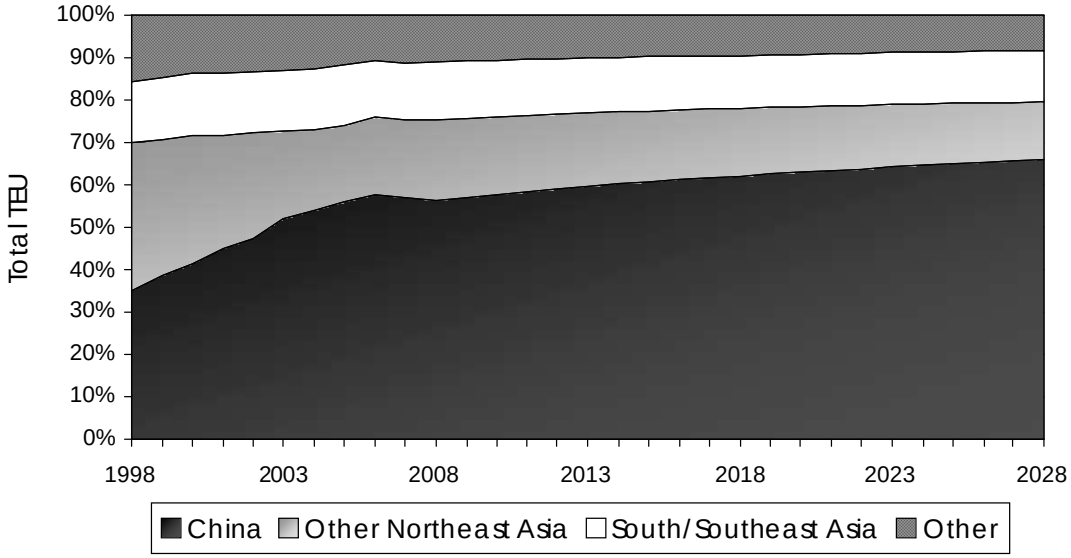


Note: "Other" does not include domestic container trade with Alaska or Hawaii.
Source: IHS Global Insight

However, containerized trade with China has been growing at a much faster rate than trade with other regions. According to both IHS Global Insight and PIERS, by 2005 China's volume of international container trade with the U.S. North Pacific was greater than that of the rest of Northeast Asia, and by 2008 China's share was approaching 50 percent while that of Northeast Asia had approximately 33 percent. By 2028 China's share is projected to pass 50 percent, while that of Northeast Asia is expected to drop to 27 percent.

Trends in the North Pacific international full container trade often follow those of the South Pacific container trades. (Note: IHS Global Insight defines South Pacific ports to include all ports in California.) As shown in Figure 1-2, the shift of trade to China has already occurred at South Pacific ports. As early as 1998 the volume of containers traded with China equaled that of the rest of Northeast Asia, and by 2007 China accounted for three times the volume as the rest of Northeast Asia. The actual volume of containers traded with Northeast Asia has not changed substantially, but the volume traded with China more than tripled between 1998 and 2007.

Figure 1-2: Share of International Container Trade
South Pacific Ports (California)



Note: "Other" excludes domestic container trade with Alaska and Hawaii
Source: IHS Global Insight

The volume of containers traded between South Pacific ports and South/Southeast Asia doubled between 1998 and 2007, but this region's share of the South Pacific trade decreased slightly, due to the growth of China.

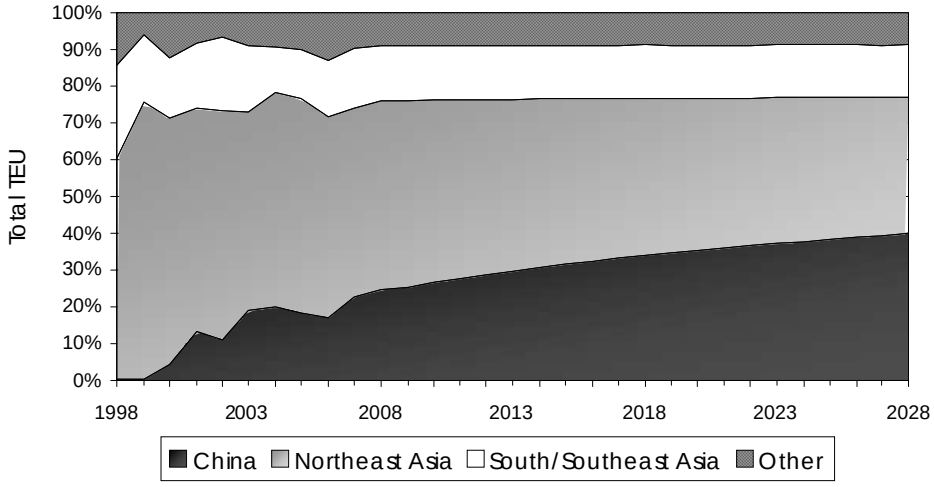
Over the next 20 years IHS Global Insight is projecting that the rate of growth in containerized trade moving through South Pacific ports will slow. However, given the already high volumes, even these lower rates of growth mean that there will be a large increase in the total number of containers moved. China is expected to account for approximately 70 percent of this growth.

Grain

China is also growing in importance in the North Pacific grain trade. The entire Northeast Asia region, including China, has accounted for approximately 75 percent of North Pacific grain and oilseed exports since 1999, and the region's relative market share is not expected to change substantially throughout the forecast period. What is expected to change, however, is the growing importance of China.

In 1998 and 1999 China (including Hong Kong) accounted for less than 1.0 percent of North Pacific grain and oilseed exports, importing just 71,000 metric tons in 1998, and 30,000 metric tons in 1999. During these same two years the rest of Northeast Asia imported 9.3 million and 13.4 million metric tons of these products. Beginning in 2000, however, China began to import large volumes of grain through North Pacific ports. China's import volume shot up to 750,000 metric tons in 2000 and to 2.3 million metric tons in 2001, and since 2003 has ranged between 3.5 million and 6.3 million metric tons. (see Figure 1-3).

Figure 1-3: Share of International Grain Trade
North Pacific Ports



Note: Grain includes wheat, barley, corn and sorghum, as well as oilseeds such as soybeans.
Source: IHS Global Insight

China's share of North Pacific grain and oilseed exports jumped from 0.2 percent in 1999 to 4.3 percent in 2000, and has since risen to nearly 23 percent. Although the growth in China's market share of North Pacific exports has caused the market share of the rest of Northeast Asia to decline, the actual volumes shipped to this region have climbed sharply. From 9.3 million metric tons in 1998, Northeast Asia's imports have grown to more than 14.0 million metric tons in recent years, and have only fallen below the 1998 level in one year (i.e., 2002).

Overall, North Pacific grain and oilseed exports grew from less than 16 million metric tons in 1998 to nearly 28 million in 2007.

Global Trade and Economic Outlook

The following overview of global trade and the world economy is based on information available in late 2008. The analysis of each region or country provides a short-term view of factors impacting those economies. Since this was written, the world economy has continued to shrink dramatically, making some of this information dated. However, the port forecasts presented in this report are long-term projections to the year 2030. While economic recovery may be delayed in the short-term, trade is expected to eventually recover, and the forecasts presented here reflect this long-term view.

The cumulative effect of financial-market turmoil, and delayed policy responses by some major central banks, has led IHS Global Insight to further revise down its projected world economic growth numbers for 2008 and 2009 in its latest bottom-up forecast (released October 15, 2008). We now expect the world economy's deceleration to be more substantial, with global GDP growth moderating from a 3.8 percent average annual pace during the past four years (2004–2007) to a below-trend rate of 2.1 percent in 2009.

International trade can no longer be counted upon to hold up world growth. During most of the current global business cycle, international trade has been a key to the global economy in general, and to raw-material exporting economies and countries with undervalued currencies in particular. With nearly two-thirds of the global economy now in rather poor shape, trade can no longer be a

major pillar of world growth. Nevertheless, for economies with weak currencies, such as the U.S., world trade will likely remain a significant source of economic growth, albeit weak growth.

The intensification of the global financial crisis has increased the likelihood of a world recession. The ongoing global credit crunch has already persuaded many major central banks to inject huge amounts of liquidity into their banking systems in addition to cutting their policy rates. Furthermore, given the fact that global inflationary expectations are very low, there is substantial room for central banks to further lower their policy rates. Fortunately, the huge correction in energy and other raw material prices since July, along with the additional deflationary effects resulting from the intensification of the global credit crunch since September, are greatly weakening inflationary pressures.

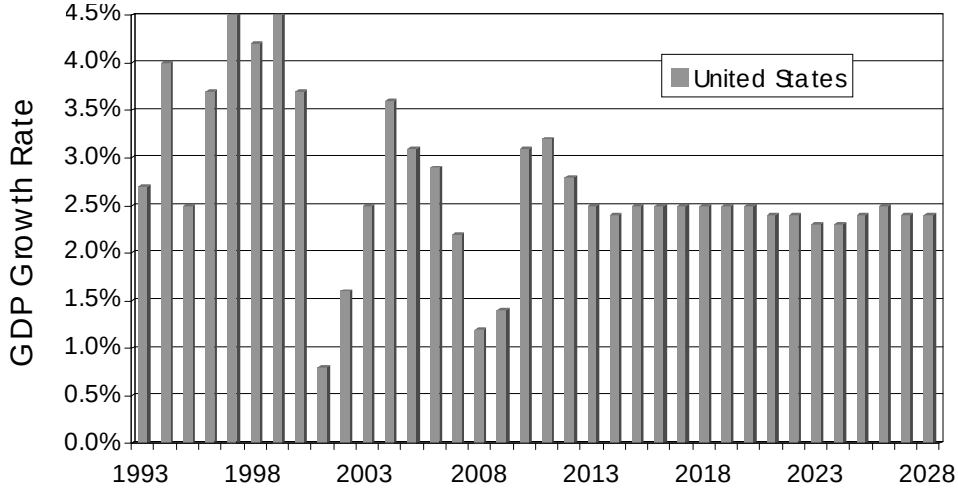
The bottom line is that the global economy is in the midst of a major downturn that may last until 2010, and the subsequent recovery may prove disappointing given that the source of the ongoing weakness is the continuing correction in housing markets. Housing market corrections tend to be protracted processes that can last five to ten years. With most banks continuing to tighten their lending standards for businesses as well as consumers, financial markets will remain jittery and vulnerable to periodic bouts of intense volatility and disruptive risk re-pricing. Indeed, given the severity of the distortions in asset markets from the past several years' easy credit, the complete normalization of credit markets could take several years.

North America

United States

Since the first signs of crisis in the financial markets in August 2007, the worst fear was that the financial crisis and the slowdown in economic growth would reinforce each other, dragging the economy into recession, perhaps a severe one. We now have the recession, and the only question now is how deep. We expect three consecutive quarterly declines in real GDP starting with the third quarter of 2008, the steepest being the 1.5 percent drop expected for the fourth quarter. As shown in Figure 1-4, GDP growth forecast for 2008 has been cut to 1.5 percent, from 1.8 percent, and our growth forecast for 2009 cut to 0.2 percent, from 1.0 percent.

Figure 1-4: GDP Growth Rates, United States



Source: IHS Global Insight

The flow of funds through the financial system has, in effect, seized up. The interbank market is not functioning, and the only asset that investors are comfortable holding is U.S. government debt. The seizing-up of credit is working its way into the broader economy as consumers, businesses, and state and local governments find it harder or impossible to obtain credit—and cut back on spending, investment, and hiring as a result.

The economy was turning down even before the latest and most severe phase of the credit crisis. Consumers are retrenching, with real consumption estimated to have dropped 2.8 percent in the third quarter—the worst quarter since the end of 1990. Home sales, starts, and prices continue to decline, with no end in sight. Export growth is no longer enough to keep manufacturing afloat. The key Institute for Supply Management (ISM) manufacturing index, which has hovered close to the breakeven 50 level for most of this year, fell into the 40-45 recession zone in September. And the decline in the labor market is accelerating, with 159,000 jobs lost in September, the worst month yet in this cycle. We expect job losses of around 200,000 per month in the fourth quarter.

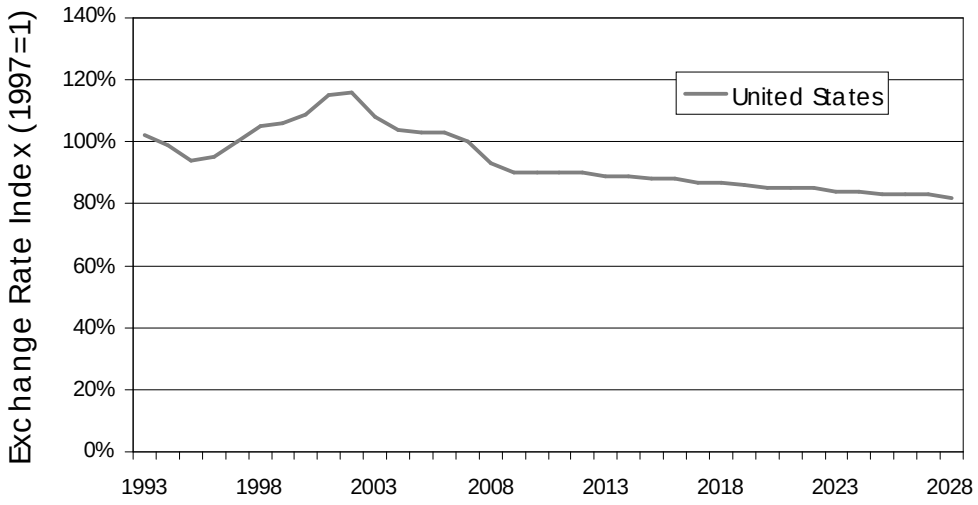
Most of the supports to growth are being knocked away. Nonresidential construction has stayed remarkably strong as the credit crunch has tightened, but it is only a matter of time before it gives way. State and local government spending will decline as budget deficits have surged, and states and localities are finding it increasingly difficult to obtain funding. Export growth will weaken as growth in the rest of the world weakens—the idea of "decoupling" from the U.S. economy has been debunked.

Compared with the alternative of doing nothing, the $700 billion "rescue" package, by which the Treasury will buy up bad financial assets, was worthwhile. It will replace illiquid assets with cash, so directly addresses the liquidity problem. But it will only help in recapitalizing the financial system to the extent that the Treasury overpays for assets, which raises the question of whether the taxpayer's interest will be sufficiently protected by the equity warrants that the Treasury will acquire.

The downturn in global growth is bringing commodity prices down and is quickly taking care of the inflation threat. Headline Consumer Price Index (CPI) inflation peaked at 5.6 percent in July. A year from now, we expect it to be close to zero. Core inflation will prove more stubborn than the headline, but we expect it to be back within the Fed's 1 to 2 percent comfort zone next year as commodity costs come down, higher unemployment reduces wage inflation, and profit margins are squeezed.

As shown in Figure 1-5, over the past decade U.S. consumers have enjoyed the benefits of a strong U.S. dollar, with relatively lower costs for imported goods. In 2008, however, the value of the U.S. dollar dropped sharply relative to other currencies, and IHS Global Insight is projecting that over the next 20 years the dollar will continue to slowly lose value. This drop in the value means that U.S. exports will become more competitive, but will also hold import growth to lower levels than those seen in recent years.

Figure 1-5: Exchange Rates



Source: IHS Global Insight

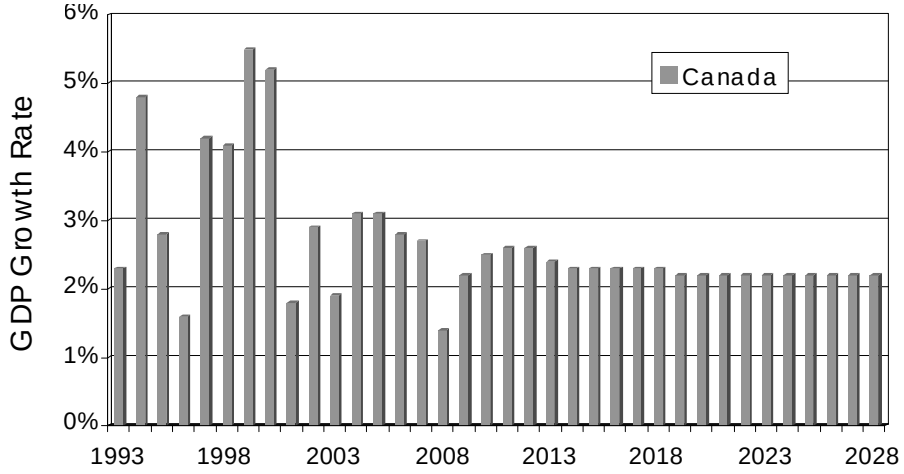
Canada

The forecast for less than 1 percent growth for both this year and next is very weak by any standard. The Canadian economy grew almost three percent in both 2006 and 2007. By contrast, in 2008 Canada was forecasted to grow less than not only the U.S., but than any other G-7 country except Italy. While the U.S. is the originator of the financial and economic difficulties Canada faces, U.S. growth will exceed Canada's this year, partly because the U.S. fiscal stimulus package stimulated U.S. growth for 2008 at the expense of 2009. Indeed, U.S. growth is projected to be considerably weaker in 2009, falling below the pace in Canada.

It is important to emphasize that the weakness in Canada's economy is very much in the trade sector. Canada's exports are now forecasted to fall by 4.1 percent this year and another 1.6 percent next year. With overall economic growth of 0.6 percent this year and 0.9 percent next year, consumption is growing almost four percent this year and over two percent next year. The government sector is growing at about four percent and business investment is growing at about one percent. Canada's trade sector is weak, very much due to the Canadian dollar still being strong by historical terms, the weak demand from the U.S., and industry-specific problems in autos, forestry, and tourism. It is therefore difficult to argue that the weak state of the Canadian economy is due to "made in Canada" economic policy mistakes.

As shown in Figure 1-6, it appears that the worst is already past for Canada, but growth is not expected to reach its near-term potential pace until 2010. Nevertheless, given the much stronger labor and consumer markets both this year and next in Canada compared with the U.S., it is accurate to make a distinction between Canada's "no recession" position and the U.S. "recession." This evaluation of economic growth and labor markets is apart from the much more solid footing of Canada's financial institutions and government balances.

Figure 1-6: GDP Growth Rates, Canada



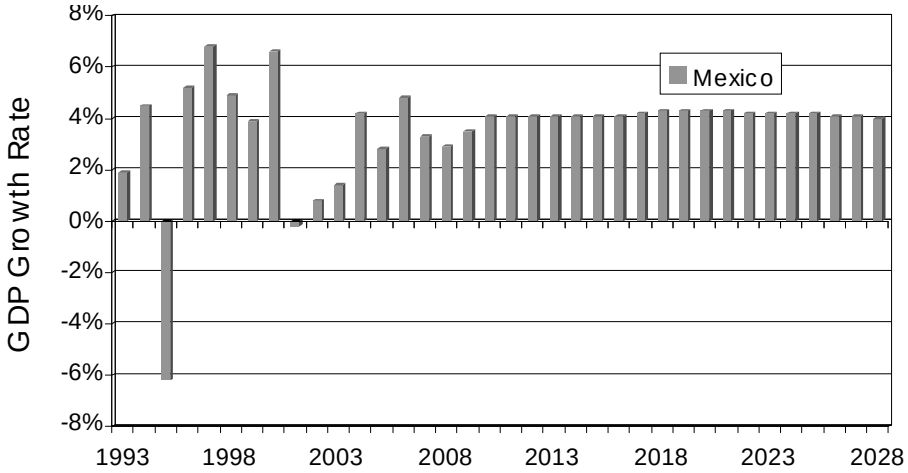
Source: IHS Global Insight

Mexico & Central America

The risk profile for the Latin American region has worsened in absolute terms as the U.S. and other industrialized economies have fallen into an economic downturn. Economic growth is expected to decelerate significantly from 5.1 percent in 2007 and an estimated 4.1 percent in 2008 to 3.0-3.3 percent in 2009. (See Figure 1-7). Mexico and Central American nations will be the most affected due to their close ties to the U.S. economies, not only through the trade channel, but also due to lower remittances from nationals of these countries working in the U.S. Investment, which has been the major driver of growth in the region for the past two years, will slow down although we do not expect ongoing projects in infrastructure and in the energy sector to be stopped.

The threat of double-digit inflation is vanishing rapidly as prices of oil, commodities, and food products deflate in international markets; acceleration of inflation had led central banks to implement restrictive monetary policies through the third quarter of the year. However due to the financial crises in the U.S. and Europe, and given that inflationary pressures and expectations have diminished drastically, central banks in the region are moving to relax monetary conditions.

Figure 1-7: GDP Growth Rates, Mexico



Source: IHS Global Insight

Foreign exchange markets in Latin America have not been immune to global financial turmoil; previously overvalued domestic currencies are currently facing a large amount of pressure for depreciation, as foreign capital flies out of the region in the so-called fly to quality move. The central bank in Mexico is intervening in foreign exchange markets in an effort to reduce high volatility. We expect that the inflationary effect of currency depreciation will be more than offset by lower prices of commodities, as well as lower inflationary expectations and lower demand in a context of decelerating economic growth.

Asia Pacific

In general, economic growth in the Asia Pacific region will slow from the record highs of recent years as the recession in the U.S. and Europe undermines exports. Conversely, imports will continue to be inflated by high global commodity prices. Support to exports will be provided by demand from within the region and in expanding markets among the world's commodity exporters.

Growth in China is expected to slow, as authorities implement more aggressive tightening measures and unresolved structural imbalances in the economy increase the potential risks of a hard landing. Moreover, intra-regional trade within Asia has been largely driven by vertical specialization of the production chain, the source of final-stage demand for which remains largely with the developed economies. Increasingly, impetus in regional growth will shift to recovering domestic demand, with the resilience of investment and consumption remaining the key variable in the near-term outlook. IHS Global Insight currently forecasts aggregate growth in the Asia Pacific region to slow to 4.7 percent in 2008, from 6.0 percent in 2007.

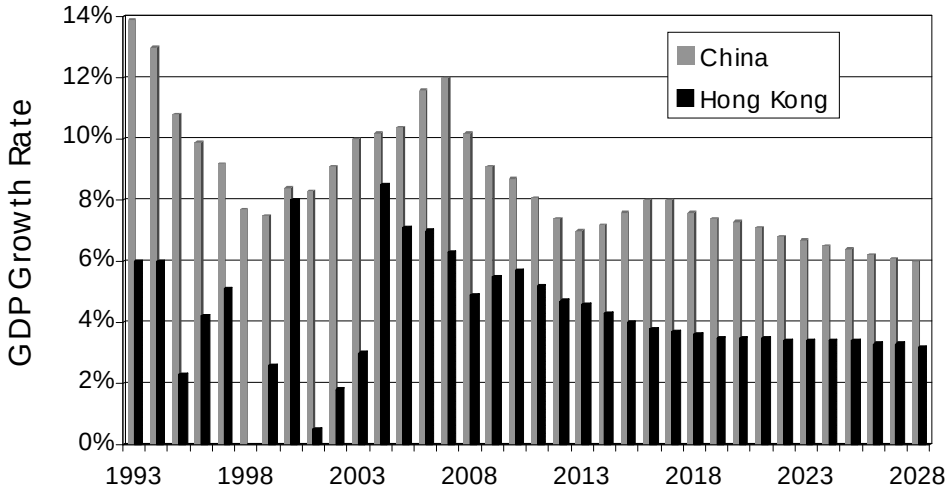
Governments, central banks, and banking regulators across the Asia Pacific region continue to take action to combat the severe tightening in liquidity that has been seen in their banking and larger financial sectors. For the most part, emerging market banking sectors in Asia have not suffered direct exposure to the U.S. and European financial crisis. This is because holdings of securities related to U.S. residential mortgages are minimal, domestic financial institutions have relatively low exposure to affected Western financial institutions, foreign banks have a still-limited presence in the these economies, and domestic banks do not depend on foreign capital markets for funding.

Despite this, the Western crisis appears to have created reluctance by banks to lend to each other in Asian emerging banking sectors, tightening inter-bank liquidity. The high level of deposit funding in these banking sectors makes this less damaging than it otherwise would be, but ensuring sufficient inter-bank lending is extremely important to a healthy liquidity position in the banking sector. These economies will no doubt continue to take strong actions to ensure sufficient liquidity conditions.

China

As shown in Figure 1-8, growth in China and Hong Kong should continue to slow into 2009. The risk of the outlook is heavily weighted on the downside, as the two engines of the current expansion, exports and investment, are showing signs of weakness. The central government's shift in economic policy away from battling inflation and towards buttressing economic growth further highlights the seriousness of the possibility of a significant slowdown in economic growth. Consumer demand, which has exhibited some degree of inelasticity to income fluctuations, should provide some cushion against the export and investment slowdown.

Figure 1-8: GDP Growth Rates, China and Hong Kong



Source: IHS Global Insight

The outlook for China's exports has deteriorated. Growth of China's exports, particularly exports to the U.S., has already been trending down since mid-2007, due to weakening demand and Chinese currency appreciation. With around half of China's exports in processing trade, slowing export growth in China typically leads to weaker import growth, which limits the shrinkage of trade surplus.

Accelerating inflation remains a key. Rising input costs, compounded by recent wage growth across the region, will add further pressure to company profit margins as export earnings truncate. Consumer spending could also be undermined if income growth fails to keep pace with inflation. High and rising inflation will circumscribe interest-rate cuts in support of domestic demand, while room for fiscal stimulus is limited by high levels of public debt, particularly in South Asia.

Other Northeast Asia

Japan

Japan experienced a "lost decade" after the recession of the early 1990s, characterized by persistently weak growth, deflation, structural unemployment, weak financial institutions, and fiscal deficits. Japan has never fully recovered; since 1993 annual GDP growth has exceeded 2.0 percent only three times—in 1996, 2000, and 2006—and fell below 1.0 percent in eight out of 16 years. Between 2008 and 2013 GDP growth is projected to average between 1.5 percent and 1.7 percent, and beyond 2013 is projected to slowly drop to just 0.6 percent per year after 2021.

The Japanese economy did well at the start of 2008, generating growth when other countries were beginning to slow. This began to change in the second quarter as rising import prices hurt household spending, and declining exports caused capital expenditures to fall. The manufactured goods sector is being hit hardest, and the fall in overseas demand is harming consumer electronics, automobiles, and other heavy industries.

Monetary policy has had little influence. Interest rates were low to begin with, and are now virtually zero. Real interest rates remain high, though, because of the return of deflation. The downward trend in prices is making imports cheaper, but also forces exporters to drop their yen prices to remain competitive. As a result, fiscal policy will be the only growth driver in the near term.

It appears that the economy will have to bottom out naturally. The downturn is still in the early stages and will accelerate as unemployment begins to rise and depresses consumption even more. This could continue into the second half of 2009, with sustainable recovery not taking place until early 2010.

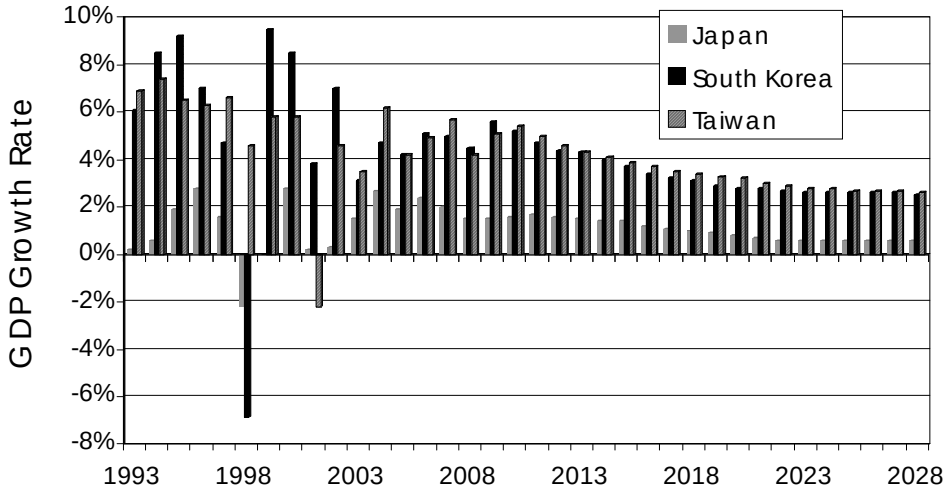
South Korea

With the exception of 1998, South Korea has fared much better than Japan since 1993. Between 1993 and 2000, GDP growth fell below 5.0 percent only twice: at the beginning of the "Asian Flu" in 1997 GDP grew by 4.7 percent, and during the height of the crisis in 1998 GDP actually declined by 6.9 percent. Recovery was fast, however, with GDP growth of 9.5 percent in 1999 and 8.5 percent in 2000. Since that time growth has fluctuated between 3.1 percent and 7.0 percent. Looking into the future growth is projected to slowly decline, from more than 5.0 percent in 2009 and 2010 to 4.0 percent in 2014. By 2019 Korea's annual GDP growth is expected to fall below 3.0 percent, and to maintain average growth of approximately 2.6 percent in the out years.

Taiwan

The economy of Taiwan has seen growth patterns similar to those in South Korea, but with less extreme peaks and valleys. Between 1993 and 1997 annual growth averaged more than 6.5 percent. The Asian Flu made only a small impact on economic growth in Taiwan, with GDP still managing to grow by 4.6 percent, in comparison to the 6.9 percent decline in South Korea. If 2001 is excluded, Taiwan's GDP growth averaged approximately 5.0 percent per year. Like South Korea, Taiwan is expected to see slowing growth over the long term, declining from more than 5.0 percent through 2011, to less than 4.0 percent in 2015, and to a long-term average of 3.0 percent or less after 2020. (See Figure 1-9 for Northeast Asia GDP growth rates).

Figure 1-9: GDP Growth Rates, Other Northeast Asia



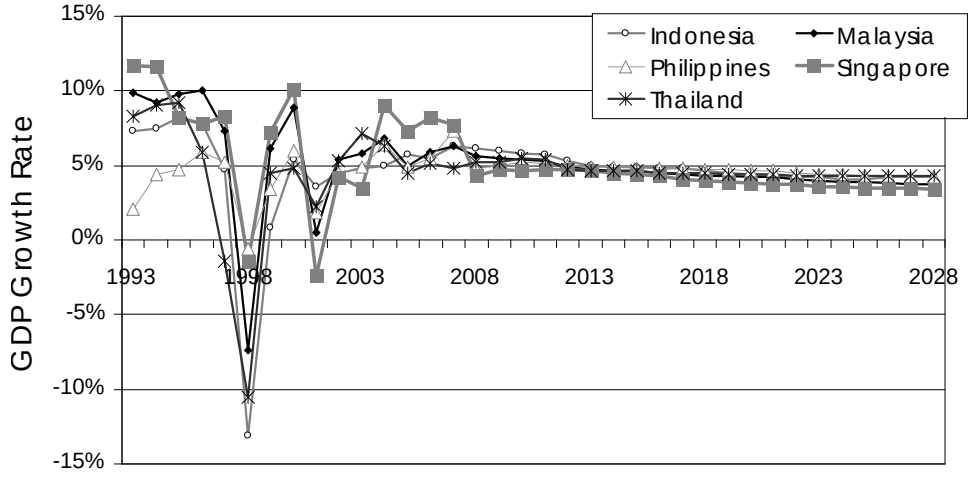
Source: IHS Global Insight

Southeast Asia

Over the last 15 years the economies of Southeast Asia have generally experienced very strong growth, punctuated by severe slowdowns during the "Asian Flu" in 1998 and worldwide recession in 2001. With the exception of those two short periods, growth in most of the countries in this region has generally averaged better than 5.0 percent per year. In the long run, GDP growth in these countries is projected to slowly decline from the 4.5 percent to 6.0 percent range in 2008, to an average of 3.5 percent to 4.5 percent in the out years.

As shown in Figure 1-10, in 2009 the Asia-Pacific economy is poised to experience its weakest growth since the cataclysm of the 1997-1998 financial crisis. The rate of deterioration in the regional outlook since lat 2008 has been stunning, underscoring the tight correlation of growth with demand cycles in the developed economies. This retrenchment in external demand has become acute, pulling industrial output growth down as producers moved to reduce inventories.

Figure 1-10: GDP Growth Rates, Southeast Asia



Source: IHS Global Insight

Private domestic demand growth is unlikely to offer sufficient compensation for collapsing exports. Domestic demand still remains a comparatively stunted driver of regional growth with the share of exports in GDP actually increasing since 1997-1998. Falling earnings and declining prices for manufactured goods will force companies into investment cuts and even downscaling of production capacity. Commodity exporters are witnessing a rapid deterioration in the terms of trade as global prices collapse.

On the demand side, governments across the region have announced a succession of major fiscal-stimulus packages with measures ranging from direct cash disbursals to vulnerable households to major infrastructure projects. However, the ability of governments to compensate for the expected downturn in private-sector activity remains debatable. More perniciously, Asian economies could resort to a round of competitive exchange-rate devaluations aimed at preserving export competitiveness. Such a move could prove fundamentally counter-productive, fueling political tensions in global trade relations and protectionist leanings.

Latin America

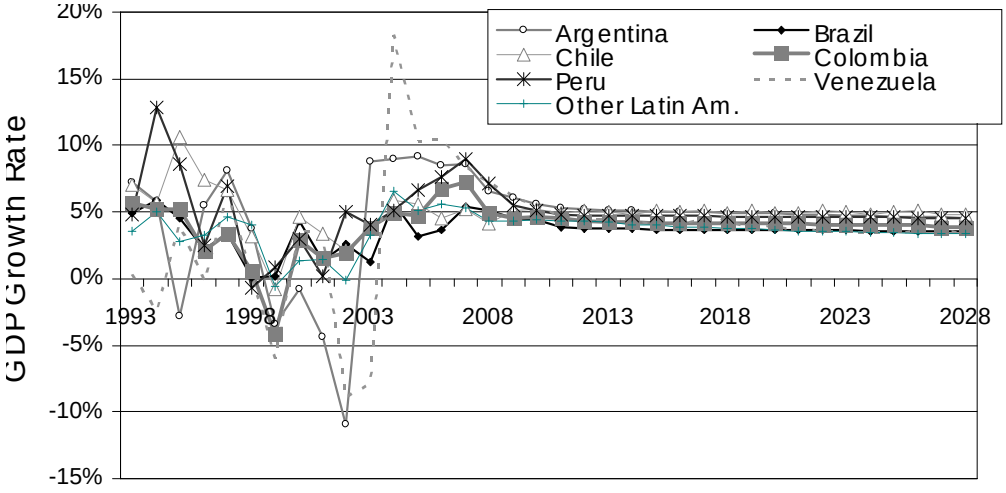
The risk profile for the Latin American region has worsened in absolute terms as the U.S. and other industrialized economies fell into an economic downturn. Exports from Latin America to the U.S. and other major markets face the imminent risk of lower demand and lower prices as the bubble in world commodity prices deflates; this in turn will have a negative impact on public finances as lower profits of exporting firms translate into lower income tax revenue for the government.

Uncertainty has already taken its toll on Latin American stock markets, although it is important to highlight that these stock markets were severely overvalued and the bubble burst is in many cases a market correction. In addition, given that stock exchanges in Latin America are relatively small compared to the size of their respective economies, the drop in wealth due to declining stock values will not affect overall private consumption. However, uncertainty and fears of an economic downturn may negatively affect business sentiment and consumer confidence regardless of the volatility in stock markets.

Once the Latin American economies have weathered the current economic crisis, growth is expected to resume at a steady pace. After 2011 or 2012 the main economies in the region are

expected to see annual GDP growth rates between of 3.8 percent and 5.1 percent per year, with growth expected to slowly decelerate to between 3.4 percent and 4.5 percent per year by 2030, as shown in Figure 1-11.

Figure 1-11: GDP Growth Rates, Latin America



Source: IHS Global Insight

While the risks are substantially high, Latin American economies are better shielded to resist a global crisis: compared to the late 1990s the debt profile of the large majority of countries in the region has improved substantially: lower total debt ratios, longer maturities and lower interest rates, and lower debt service as well. Many countries now enjoy fiscal surpluses and others have reduced the size of their deficits; foreign exchange reserves are relatively abundant to resist massive capital outflows and lower export revenue. All in all, the region is better prepared to defend itself against the contagion of the U.S. crisis, however it is not immune and risks continue to increase day by day.

Western Europe

The financial crisis has intensified fears that the Eurozone is headed for recession or, indeed, is already in it. Retail sales are generally soft, the manufacturing sector is struggling markedly, and the service-sector is contracting. Meanwhile, exports are showing clear signs of faltering.

Heightened financial-sector turmoil (a number of European banks have had to be rescued or helped by the authorities) and very tight credit conditions are clearly hurting economic activity across the Eurozone and the full effect has yet to be felt. In addition, the Eurozone economy has faced a persistently strong euro, elevated oil, commodity, and food prices, slowing growth in key export markets. Meanwhile, significant corrections in overvalued housing markets in Spain and Ireland are hitting the rest of the economy hard, and this may well happen to a lesser extent in some other countries, possibly even France and the Netherlands.

A strong euro and softer global growth are hitting the Eurozone's trade performance. Indeed, the euro traded at a lifetime high just above $1.60 against the dollar in July 2008. Although the euro has since retreated to trade back below $1.30, it is still relatively elevated and has weighed on Eurozone competitiveness, with worrying implications for trade.

On balance, therefore, IHS Global Insight forecasts real Eurozone export growth to drop from 6.1 percent in 2007 to -5.3 percent in 2009. Meanwhile, real Eurozone import growth is projected to retreat at a similar rate, from 5.5 percent in 2007 to negative 2.9 percent in 2009, as Eurozone

domestic demand slows and the strength of the euro enhances imports' competitiveness. Furthermore, the high oil prices in 2008 pushed up Eurozone imports in value terms and limited the Eurozone's trade surplus. With the Eurozone's deficit in net transfers remaining substantial in 2008, the Eurozone's current account moved from a surplus of 26.4 billion euro (0.3 percent of GDP) in 2007 to a deficit of 51.2 billion euro (0.49 percent of GDP) in 2008. The current account is forecasted to be in deficit by 74.2 billion euro (0.8 percent of GDP) in 2009.

Central Europe and the Balkans

The latest forecast for Central Europe and the Balkans has growth in this region declining modestly to 4.5 percent in 2008, from 5.6 percent in 2007. Poland and Turkey are by far the largest economies in the region. The Polish rebound in 2006–2007, driven by domestic demand but supported by exports, can be expected to lose only a modicum of its momentum, thanks to tighter monetary policy and the unfavorable external economic environment. Turkey's rebound in aggregate output, following the tightening of policy during 2006–2007 to rein in inflation and the current-account deficit, lost steam in 2008 because of tighter global credit conditions, but will begin to gain some momentum again in 2009.

The Baltics, the growth leaders in recent years, will further dampen growth, through tighter policy, to more sustainable rates, given large external payment imbalances and stubborn inflation. Should these economies fail to rein in external payments imbalances and inflationary pressures sufficiently, a hard landing for one or more of them is not out of the question. Tighter worldwide credit conditions may slow growth of domestic credit in the Balkans to help reduce the danger of overheating. Rapidly expanding domestic credit has figured importantly in driving both private consumption and gross fixed capital formation there in the past several years.

Export growth moderated in 2008 as growth in aggregate demand from Western Europe decelerated. The region's imports will continue to grow robustly, however, boosted by trends in world-market prices for key imported commodities, fuels in particular, but moderated, on the other hand, by decelerating growth of domestic demand with its substantial import component. Thus, we are currently estimating the aggregate trade deficit for the region to increase quite modestly in relative terms in 2009 to 6.8 percent of GDP, from 6.7 percent in 2007, and peak at 7.3 percent in 2010, before receding gradually.

Middle East and North Africa

The Middle East and North Africa region saw another year of strong growth in 2008. While the rest of the world prepared for the trickle-down effects of the financial crisis, the economies of this region were on track to carry the region's ongoing oil-fueled boom into its sixth year. With global oil prices peaking at an all-time record in 2008, oil exporters ratcheted up their fiscal spending. While the region's economic fate continues to depend on its oil wealth, the pace of its real growth will again be set by its non-oil sector expansion, the demand for which is generated by the domestic recycling of oil revenues.

Inflation has markedly accelerated across the region and will remain a key challenge for in the near term. Strong fiscal spending, robust domestic demand, and lax monetary policy have provided the impetus for rising inflation and overheating in the region. The rapid recycling of petrodollars and negative real interest rates are fueling strong domestic liquidity growth, thereby generating further upward pressures on prices. Additionally, price pressures around the region were being stoked by the weakening of the U.S. dollar, to which several regional currencies are pegged, through the resulting rise in import costs. As a result, without a concerted effort to curb inflation

we expect overall inflation to end near 13 percent on an annual average basis in 2008 and still be high next year as well.

Financial risks have increased because of inflationary pressures and the fallout from the ongoing crisis in the global capital markets. The region is certainly not impervious to what is happening in overseas financial markets, and there is now a greater risk of increased volatility and higher risk premiums in the local equity markets. Moreover, the tightening of liquidity overseas has lead many of the multinational firms that had been considering foreign direct investment in the region to reconsider their plans, while the credit crunch has begun to squeeze funding conditions throughout the region as well.

The rapid expansion has further aggravated supply constraints and pushed inflation higher, particularly in the Gulf region. Development plans are encountering rising costs and severe shortages of skilled labor, materials, and equipment, which have led to project cost overruns, delays, and eroded profitability. Authorities from the region's oil-exporting countries will have to begin adjusting their spending lower and take a more measured approach to their infrastructure investment in order to address the persistent inflationary pressures, supply shortages, and bottlenecks. As a result of capacity constraints and the deteriorating global economic conditions, we expect GDP growth in the region to moderate in 2009. Furthermore, a lower oil-price profile and greater difficulties accessing capital threaten to dampen business activity across the region more significantly over the coming quarters.

Sub Saharan Africa

Real GDP growth averaged more than 5 percent for the fifth consecutive year in 2008, and will remain relatively robust in the near-to-medium term. High export revenues and the accompanying fiscal expansion, rapid foreign direct investment (FDI) inflows, particularly in the energy sector, expansion in the construction sector, and improved performance in agriculture are among the top underlying factors promoting this growth. High rates of import demand from China and India will continue to benefit African exports.

The external sector will remain vulnerable to excessive dependence on the export of primary commodities. Commodity price fluctuations, therefore, have been and still remain an important source of risk to trade in the region's economies. Fluctuations in demand by industrialized commodity-importing countries or supply shocks in developing commodity-exporting countries will continue to produce sharp swings in both world commodity prices and in trade balances in the short-to-medium term. For the region's major net oil exporters, trade surpluses will fall after 2008.

South Africa, the region's largest economy, is now projected to grow at a slower rate in 2009. Softer global growth, a slowdown in domestic consumption due to tightening monetary conditions on the back of reluctantly high domestic prices, and the potential loss in production due to power outages, have led IHS Global Insight to review the economic growth for 2008–2009. Real GDP is now projected to grow 3.6 percent in 2008, much lower than the regional average of 5 percent. We now expect the cyclical slowdown to extend well into the first half of 2009; thereafter, investment spending on infrastructure, especially from the public sector, should help to bring the growth path back on track.

As key donor countries fall into a systemic slowdown and even recession, and as government budgets tighten, there is real risk that aid flows to the developing world, and thus to Africa, will fall. There are real risks to Africa's growth on the horizon stemming from a softer external environment. Many African countries still heavily depend on aid and concessional borrowing to shore up budgets

and also fund long-term infrastructural investment. Thus a cut in aid would potentially lead to a slowdown in public spending or investment, putting stress not only on the fiscal balance but also on the balance of payments and domestic economy.

The risks are also compounded by deepening current-account deficits exacerbated by high oil and food prices (which, although moderating, still remain high) and projected softer remittances and private capital flows. To some extent funds have already been committed to a large number of long-term investment projects particularly within the transportation, energy, and mining sectors; however, short-term capital flows have increased significantly over the past decade, supporting large current-account deficits. There are already strong signs that portfolio inflows have been negatively affected, and in certain countries there are signs that remittances may be starting to slow. Trade accounts also face heightening risk in the form of softer commodity prices and lower demand, although continued growth within key Asian markets is expected to buffer this effect. Although the water is murkier in 2009, all is not doom and gloom as domestic conditions remain fairly robust despite strong inflation rates; thus, although IHS Global Insight projects a slowdown through 2009, a recession still remains unlikely.

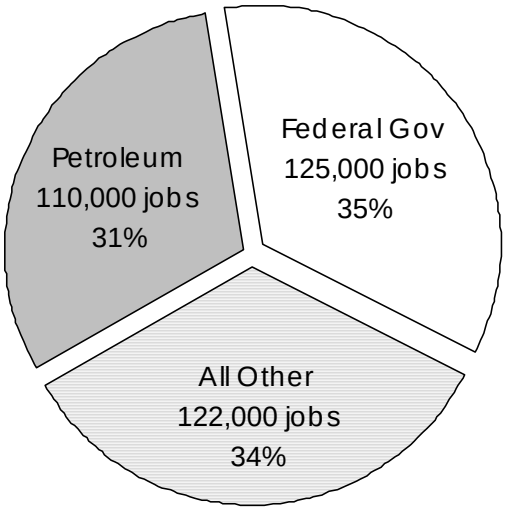
Alaska and Hawaii

Alaska

According to the Institute of Social and Economic Research (ISER) at the University of Alaska Anchorage, what drives Alaska's economy is new money: money coming in from outside the state. How big the economy is, and how much it grows, depends on how much new money comes in. New money comes from "basic" sectors, which are the basis for all jobs and income across Alaska. They are, in effect, the gears driving the economy.

Alaska has eight main basic sectors, but the two key sectors are the petroleum industry and the federal government. Figure 1-12 illustrates the importance of these two sectors in relation to the entire state economy. As the figure shows, each of these sectors accounts for approximately one-third of the state's economy, with all other sectors accounting for the final third. As stated by ISER, if the flow of federal and petroleum money disappeared overnight, two-thirds of the jobs for Alaskans would also disappear because each of them supports a third of those jobs.

Figure 1-12: Alaska Job Generators

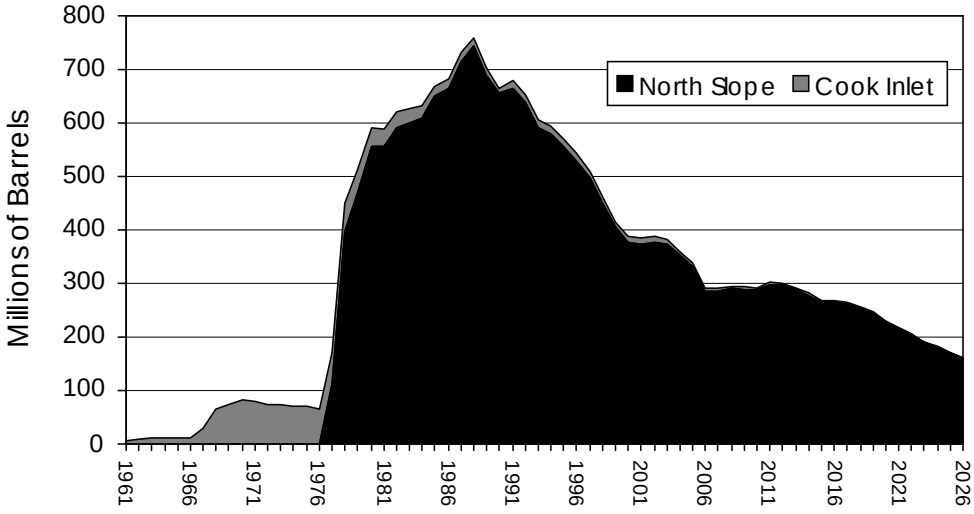


Source: UA Anchorage ISER

Alaska's other basic sectors combined support about a third of jobs for Alaskans. The seafood, mining, and timber sectors produce commodities that are exported. The tourism and international air cargo sectors sell services to people from outside Alaska. Federal retirement checks and investment income that Alaskans collect from outside sources also generate jobs.

As shown in Figure 1-13, production of oil in Alaska has been in decline since the peak year of 1988. Statewide production in that year totaled nearly 760 million barrels; by 2006 it had dropped to 291 million barrels. Over the near term production is projected to remain constant, but by 2014 it is expected to start dropping again, falling below 230 million barrels in 2020, and to approximately 160 million barrels in 2026.

Figure 1-13: North Slope Historic and Projected Oil Production



Source: Alaska Division of Oil and Gas

Prior to 1977, essentially all of Alaska's crude production occurred in the Cook Inlet region south of Anchorage. With the opening of the Trans-Alaska Pipeline, the majority of production shifted immediately to the North Slope, and since 1985 approximately 98 percent of the oil has come from the North Slope.

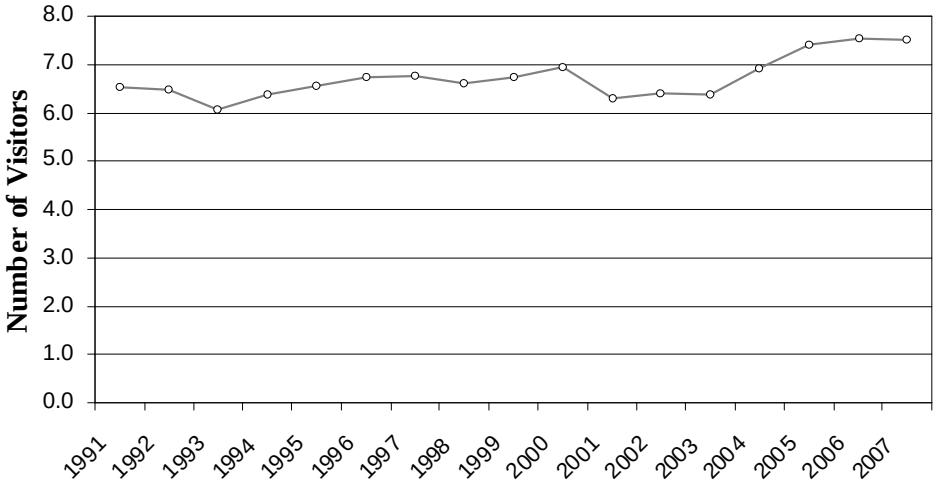
With declining production of crude oil, the largest sector of Alaska's economy, growth prospects are not strong. One mega-project that could reverse this outlook is the construction of a new pipeline to ship natural gas from the North Slope U.S. markets. After decades of planning, however, the prospects for this pipeline appear to be dimming, due to falling energy prices, the overall economic collapse and the emergence of unconventional energy alternatives such as shale gas. At the same time, there are long-term alternatives to Alaska natural gas. As a result, growth will be slow.

Hawaii

Tourism is Hawaii's leading employer, revenue producer, and growth sector. However, agricultural diversification, aquaculture, manganese nodule mining, and film and television production have broadened the state's economic base. The public sector is also a major source of jobs, and accounts for 21.5 percent of gross state product, compared with a national state average of 12 percent. Economic growth was relatively sluggish in Hawaii at the end of the 20th century, accelerating only from 2.2 percent in 1998 to 3.3 percent in 1999 to 4.6 percent in 2000.

Growth in tourism industry has been weak over most of the past 17 years. As shown in Figure 1-14, between 1990 and 2007 the number of visitors staying overnight grew from 6.72 million to 7.50 million, which represents annual average growth of just 0.64 percent per year. Between 1990 and 2000 growth was extremely slow, averaging just 0.33 percent per year. Following a dramatic drop in 2001 the industry recovered strongly for several years, but between 2005 and 2007 the number of overnight visitors was nearly unchanged.

Figure 1-14: Overnight Visitors to Hawaii



Source: Hawaii Dept of Business, Economic Development, and Tourism

The global credit crisis and deepening recession have materially worsened prospects for the Hawaii construction industry. Commercial and resort building are in retreat, hampered by a bleak national outlook and financing constraints. The residential construction downturn will continue as income and wealth losses undermine housing demand. Government spending initiatives may

provide substantial support for the industry in the medium term, but they will provide very little stimulus over the next two years.

The resident population of Hawaii, which includes active-duty military personnel and their dependents, is projected to increase from 1,275,200 in 2005 to 1,685,200 in 2035, an average rate of growth of 1.0 percent per year over the projection period. The population of active-duty military personnel is assumed to gradually increase from 43,700 in 2005 to 46,700 in 2015, and to remain constant thereafter.

Aging of the population has been one of the most prominent features of Hawaii population trends. The share of the population aged 65 years and over of the total population increased from 8.0 percent in 1980 to 13.8 percent in 2005. This trend will continue in the future, increasing this share of the total population to 22.0 percent in 2035.

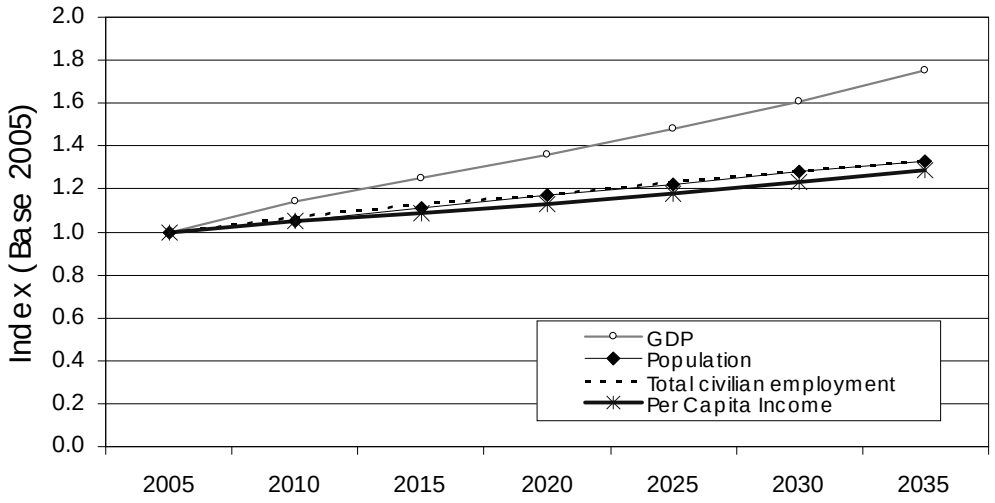
The real GDP of Hawaii is forecast to grow at 1.9 percent per year over the projection period. The growth of GDP depends on demand from outside the region as well as local consumption and investment. Personal consumption expenditures are projected to grow at 2.2 percent annually in real terms over the projection period. Government consumption expenditures are projected to grow at about the same rate as personal consumption.

Hawaii's total personal income is forecast to grow at an annual rate of 1.8 percent in real terms over the projection period. Among the components of personal income, transfer payments are expected to grow at a faster rate than other components because of increased retirement incomes of the aging population. As a result, the share of transfer payments of total personal income is projected to increase from 12.8 percent in 2005 to 18.5 percent in 2035, while the share of labor income, the largest component of personal income, is projected to decrease from 80.4 percent in 2005 to 76.8 percent in 2035.

The working-age population, consisting of persons 16 years of age and over, is expected to grow faster than the total population. This is mostly attributable to the expansion of the "older" population segment consisting of persons 65 years and over. The growth of the labor force will be slower than the growth of the working-age population as this "older" population leaves the workforce and moves into retirement.

As with Alaska, the bottom line with Hawaii's economy is that growth is expected to remain slow, as shown in Figure 1-15.

Figure 1-15: Hawaii Economic Growth Indicators



Source: Hawaii Dept of Business, Economic Development and Tourism

Chapter 2
Marine Cargo Forecast

Introduction

This chapter provides the forecast for Washington deep draft marine cargo based on the economic and trade projections presented in Chapter 1. The forecasts are organized by port region (Lower Columbia and Puget Sound/Washington Coast) and also by cargo handling type, including outlooks for container, breakbulk, neobulk, dry bulk and liquid bulk cargoes. The marine cargo forecasts are subsequently analyzed by mode and corridor in Chapter 4.

It should be noted that even though the public ports are the prime sponsors of this study, the forecasts project the volume of cargo moving through both public and private facilities. In addition, the forecasts for cargo volumes on the deep draft portion of the Columbia River cover both Washington and Oregon port facilities.

Washington State Overview

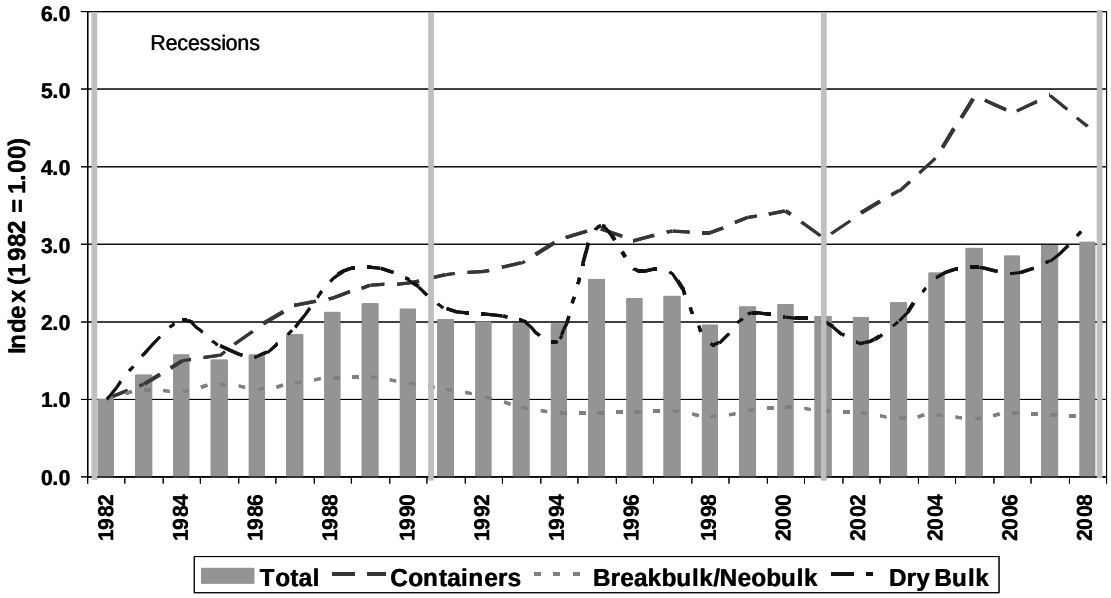
For the purposes of this study, the marine cargo forecasts have been developed for both international and domestic cargo that moves through public and private port facilities in the state of Washington, as well as that moving through Oregon ports on the Lower Columbia River. The forecasts cover all commodities and extend to the year 2030, with detail provided by direction and handling group.

This section provides a review of long-term trends and then provides forecasts by cargo handling group and region.

Washington State's public ports have experienced steady growth over the past 26 years[2]. The cargo handled by longshoremen at Washington's ports has tripled from 1982 to 2008. The most rapid growth has occurred in containerized cargoes (up five fold from 1982). Bulk cargoes have exhibited some volatility due to market conditions but are also up threefold in 2008 from 1982 volumes. Breakbulk and neobulk cargoes (logs, automobiles and unitized cargoes like steel) as a group have declined modestly since 1982. However, most of the decline is a result of reductions in log exports, which were down 78 percent over the period. Excluding log exports, breakbulk and neobulk cargoes have performed relatively well, with automobiles up 64 percent and general cargo up 27 percent from 1982 levels.

[2] The Pacific Maritime Association (PMA) is a member association that negotiates and administers maritime labor agreements with the International Longshore and Warehouse Union on behalf of its member companies (i.e., cargo carriers, terminal operators and stevedores) that operate at West Coast ports. The data shown is based on revenue tonnage (measured by weight and/or volume) as reported at terminals in Washington State served by members. This database does not include some cargoes (i.e., crude oil and petroleum products, among others), which are not typically handled by the ILWU. The database is representative of public port cargo throughput.

Figure 2-1: Growth Trends for Washington State Marine Cargo



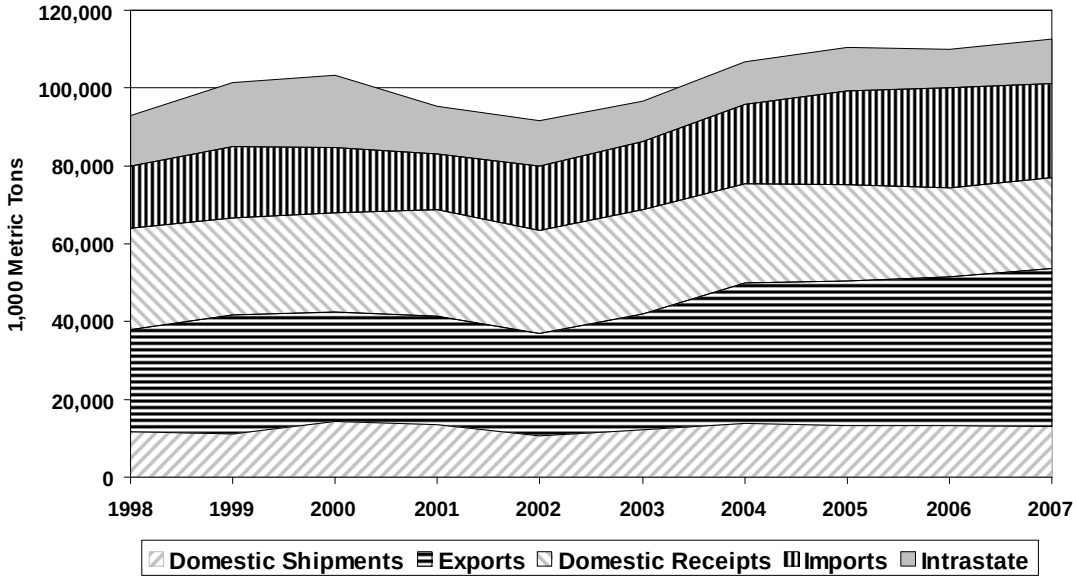
Source: Pacific Maritime Association

Including waterborne cargoes at both public and private terminals[3], Washington State throughput increased from approximately 92.9 million metric tons in 1998 to 112.5 million metric tons in 2007 (the latest year for which data is available). On an average annual basis, marine cargo grew at 2.1 percent during this period.

International trade grew the most rapidly with exports growing at 5.0 percent per year and imports grow at 4.7 percent per year between 1998 and 2007. Domestic coastwise trade (mainly with Alaska and Hawaii but also with Oregon, California and other coastal states) was relatively flat, with gains in shipments (averaging +1.3 percent per year) offsetting losses in domestic receipts (averaging -1.2 percent per year due primarily to declining volumes of crude oil from Alaska). Intrastate trade (i.e., waterborne trade within Washington State) has been relatively flat at 11 to 13 million metric tons per year throughout the study period.

[3] Data source is the U.S. Army Corps of Engineers Waterborne Commerce.

Figure 2-2: Washington State Trade by Route and Direction



Source: U.S. Army Corps of Engineers Waterborne Commerce data

Extensive forecast details are provided in the following chapters, but a succinct summary of trends includes the following points:

- Containers are still the fastest growing component of the Washington port industry; growth opportunities remain positive but Washington ports face substantial competition.
- Fully assembled autos are expected to exhibit rapid growth.
- Breakbulk cargo volumes are projected to grow slowly, due to containerization and to structural changes in the industries that produce export breakbulk cargoes.
- Logs exports have dropped sharply for more than a decade, but are projected to remain flat through the forecast period (ending 2030).
- Grain shipments, which have increased substantially in recent years, are projected to grow modestly, with Washington ports facing substantial domestic and international competition.
- Dry bulks have seen decreases in some stalwarts, such as alumina, but increases in others, such as petroleum coke. These trends are projected to continue.
- Liquid bulks are expected to shift from domestic sources to foreign sources for both crude oil and petroleum products as Alaskan production tapers off.

Changing Markets

The forecasts presented in the following chapters are based on existing trends in the markets for the commodities studied, and take into account other relevant issues about these markets that are currently known. Unknown or unanticipated industry changes are not taken into account, and new market opportunities may develop that are not covered in this forecast. For example, containers are currently handled primarily by Seattle, Tacoma, and Portland. However, due to the types of vessels calling at some of the other ports, containers may actually be handled from time to time at other ports. This has happened recently in Longview, Vancouver and Everett.

Another potential market is the import of liquefied natural gas, or "LNG." A facility in the Oregon side of the Columbia River (Bradford Landing) is currently in the permitting process. However, because plans have not been finalized for this facility, LNG volumes are not included in this study.

Mergers within industries may also lead to shifting transportation patterns that are not anticipated by these forecasts. A prime example of this is mergers in the grain industry that have led to cargo being shifted between elevators in this region. Further intra-regional shifts are possible as grain is increasingly handled by 110-car shuttle trains, and as traffic shifts to those elevators capable of handling trains of this size.

Changing priorities within individual companies may also have unanticipated effects on the forecasts. Automobiles are one market where changes at one firm can have major impacts at Pacific Northwest ports.

Puget Sound Region

Puget Sound waterborne trade is becoming increasingly dominated by containerized cargo. Historically, grain, petroleum and forest products (especially logs) have been relatively greater in tonnage, though less in cargo value.

Grain exports from Puget Sound, unlike those from the Lower Columbia, depend exclusively upon rail and originate further inland, specifically the Upper Midwest. The Lower Columbia has always been dominant in exporting Pacific Northwest wheat and barley due to the availability of barge transportation, but is now seeing increasing volumes of grain products from the Upper Midwest. However, exports of corn and soybeans via Puget Sound grain elevators have increased significantly in recent years.

Logs have declined dramatically, due to competition from other sources (Chile, Russia and New Zealand) and curtailment of log exports from federal and state forest lands. Petroleum has stabilized, based upon refinery capacity and population growth in the Puget Sound region, although there is a shift occurring from Alaska to international sources. Containers, conversely, have continued to increase, especially for destinations beyond the Rocky Mountains served by rail.

In terms of tonnage, the majority of international waterborne cargo traffic shipped through Puget Sound ports has historically consisted of exports. Due primarily to decreases in forest products exports and increases in imported crude oil, however, the gap between imports and exports has been narrowing. Imports exceeded exports in 2005, but due to growth in grain and container exports, exports exceeded imports in 2006 and 2007. However, imports are expected to grow more rapidly in the forecast years. As a result, by the year 2025 import volumes are projected to exceed exports by approximately 20 million tons.

Import tonnage grew at an average annual rate of 8.3 percent between 2002 and 2007. Growth in containerized imports and a shift from domestic crude oil to foreign are both expected to lead to import growth rates of approximately 4.2 percent per year from 2007 to 2030.

Table 2-1: Summary Cargo Trends and Forecast
Puget Sound (1,000 Metric Tons)

Year	Imports	Exports	Domestic Receipts	Domestic Shipments	Total
Actual					
2002	14,448	15,479	30,211	6,501	66,639
2003	14,990	16,456	26,682	6,150	64,279
2004	19,555	14,468	25,926	6,889	66,838
2005	21,897	17,514	26,135	7,873	73,419
2006	20,574	20,749	27,105	5,964	74,392
2007	21,488	24,854	27,903	6,151	80,396
Forecast					
2010	21,453	25,140	28,713	6,902	82,208
2015	28,275	28,086	26,933	7,426	90,720
2020	35,059	31,228	25,644	7,929	99,859
2025	49,113	33,424	20,040	8,381	110,958
2030	55,746	35,334	20,301	8,821	120,202
Average Annual Growth Rates					
2002-2007	8.3%	9.9%	-1.6%	-1.1%	3.8%
2007-2010	-0.1%	0.4%	1.0%	3.9%	0.7%
2010-2015	5.7%	2.2%	-1.3%	1.5%	2.0%
2015-2020	4.4%	2.1%	-1.0%	1.3%	1.9%
2020-2025	7.0%	1.4%	-4.8%	1.1%	2.1%
2025-2030	2.6%	1.1%	0.3%	1.0%	1.6%
2007-2030	4.2%	1.5%	-1.4%	1.6%	1.8%

Source: BST Associates, IHS Global Insight

During the same period (2002-2007), a weak dollar and strong overseas markets led to substantial increase in exports (particularly containerized goods and grains), with growth at an average annual rate of 9.9 percent. Export growth is expected to slow to an average annual rate of 1.5 percent between 2007 and 2030.

Total tonnage of foreign exports shipped through Puget Sound peaked at 25 million metric tons in 2007 up from just 14 million tons in 2002. Growth in the volume of grain exports is the prime reason for this increase.

Lower Columbia Region

For many of the same reasons as in Puget Sound, in the Lower Columbia River region imports and exports increased during the past five years. Imports at Washington Columbia River ports increased at an average annual rate of 9.6 percent between 2002 and 2007, and exports increased by an average of 9.0 percent per year. Oregon Columbia River ports also saw imports increase by 5.6 percent per year and exports increase by 6.0 percent

The existing navigation channel in the Columbia River currently provides for a 40-foot deep channel from the mouth of the river to Portland, a distance of 105 miles. This is now in the process of being deepened to 43 feet. At the end of 2008 the project was 65 percent complete, with full completion possible as early as November 2009, provided that funding is allocated. The channel provides deep-water access to facilities at the Washington ports of Longview, Kalama, Woodland and Vancouver, and to the Oregon ports of Astoria, St. Helens and Portland.

The additional three feet of draft can have a dramatic impact on the economics of using Columbia River ports. For example, a Panamax grain vessel can typically hold an additional 2,000 tons of grain for each additional foot of draft. With a payload of 65,000 tons, the additional three feet of draft can mean the difference between ships being fully loaded versus departing 9 percent light. For container ships the difference can be even higher, averaging 3,000 tons or more per foot of draft.

The forecast calls for imports to Washington ports on the Columbia River to reach 2.6 million tons in 2030. Oregon imports are projected to be 4.3 million metric tons. For the Columbia River as a whole, imports are projected to reach 6.8 million metric tons in 2030.

Import growth rates for Washington Columbia River ports are forecast to grow by an average of 1.5 percent per year through 2030, and export growth rates are projected to average 0.6 percent per year. Oregon import growth rates are projected to average 2.6 percent per year, and exports to 0.8 percent per year through the study period.

Exports from Washington Columbia River ports are projected to reach 18.2 million metric tons in 2030, while Oregon Columbia River exports are projected to reach 15.0 million metric tons. Total Columbia River export volumes are projected to reach 33.2 million metric tons.

Table 2-2: Summary Cargo Trends and Forecast
Columbia River Washington (1,000 Metric Tons)

Year	Imports	Exports	Domestic Receipts	Domestic Shipments	Total
Actual					
2002	846	10,846	459	330	12,481
2003	915	11,302	346	403	12,966
2004	1,205	11,444	265	420	13,334
2005	1,428	12,618	477	562	15,085
2006	1,701	14,822	401	540	17,464
2007	1,613	13,717	349	529	16,209
Forecast					
2010	1,837	15,033	339	549	17,759
2015	1,932	16,186	381	571	19,070
2020	2,019	16,841	423	602	19,885
2025	2,101	17,559	461	624	20,745
2030	2,178	18,090	494	644	21,406
Average Annual Growth Rates					
2002-2007	13.8%	4.8%	-5.3%	9.9%	5.4%
2007-2010	5.2%	3.6%	-6.6%	-0.4%	3.3%
2010-2015	1.0%	1.5%	2.4%	0.8%	1.4%
2015-2020	0.9%	0.8%	2.1%	1.0%	0.8%
2020-2025	0.8%	0.8%	1.7%	0.7%	0.9%
2025-2030	0.7%	0.6%	1.4%	0.6%	0.6%
2007-2030	1.3%	1.2%	1.5%	0.9%	1.2%

Source: BST Associates, IHS Global Insight

Table 2-3: Summary Cargo Trends and Forecast
Columbia River Oregon (1,000 Metric Tons)

Year	Imports	Exports	Domestic Receipts	Domestic Shipments	Total
Actual					
2002	3,945	10,790	3,292	24	18,051
2003	4,363	9,975	2,846	2	17,185
2004	4,452	9,373	3,395	-	17,220
2005	4,594	9,548	3,427	7	17,577
2006	5,320	11,066	3,732	-	20,119
2007	5,178	12,135	3,452	-	20,765
Forecast					
2010	5,240	12,145	3,452	-	20,837
2015	6,130	12,894	3,435	-	22,460
2020	7,100	13,570	3,429	-	24,099
2025	8,133	14,331	3,429	-	25,892
2030	9,241	14,996	3,428	-	27,665
Average Annual Growth Rates					
2002-2007	5.6%	2.4%	1.0%	-100.0%	2.8%
2007-2010	2.7%	4.9%	0.1%	-100.0%	3.5%
2010-2015	3.2%	1.2%	-0.1%	NM	1.5%
2015-2020	3.0%	1.0%	0.0%	NM	1.4%
2020-2025	2.8%	1.1%	0.0%	NM	1.4%
2025-2030	2.6%	0.9%	0.0%	NM	1.3%
2007-2030	2.6%	0.9%	0.0%	NM	1.3%

Source: BST Associates, IHS Global Insight

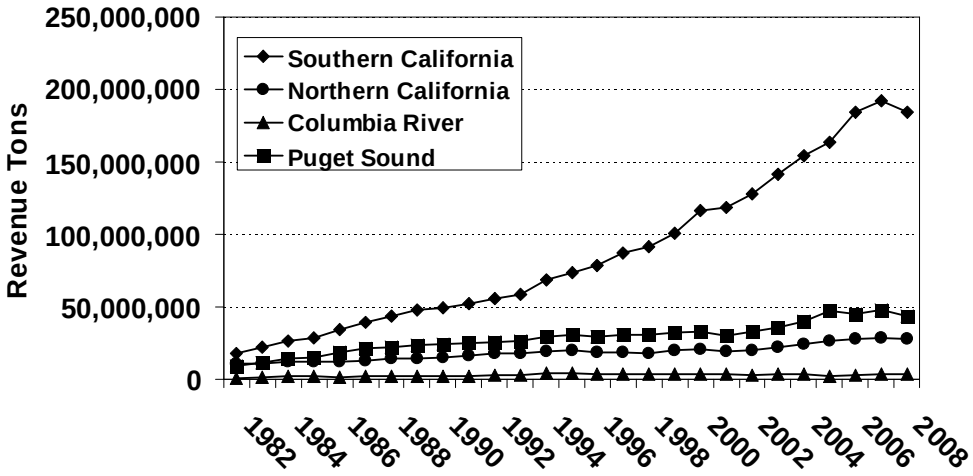
Containers

Overall Container Trends and Forecasts

Container shipping in the U.S. is still dominated by the San Pedro Bay ports (Los Angeles and Long Beach). These two ports account for more than 37 percent of full international containers shipped into or out of the U.S., and handle twice as many of these containers as all other West Coast ports combined. The size of the local population in Southern California, combined with the transportation connections and logistics industry in that region, mean that these ports will continue to exert their market dominance through the end of the forecast period (i.e., 2030).

In terms of containerized revenue tonnage, between 1982 and 2008 the share of the West Coast container market for Puget Sound ports fell from 25 percent to 17 percent; Northern California fell from 27 percent to 11 percent; the Columbia River fell from 2.1 percent to 1.3 percent. During the same span Southern California's share of U.S. West Coast container traffic grew from 46 percent to 71 percent.

Figure 2-3: West Coast Container Trends (Revenue Tons)



Source: BST Associates, Pacific Maritime Association

Despite the stunning growth and increased market share of the Southern California ports, the other West Coast ports have seen growth in the container business. In Puget Sound, container traffic increased by an average of 3.4 percent per year between 1990 and 2008.

In addition to the growth in the Transpacific trade between Asia and the U.S. West Coast, in recent years there has been an increase in the volume of containers moving by all-water routes from Asia to the U.S. East Coast. Between 1995 and 2008, the East Coast share of Asia-U.S. container trade grew from around 18 percent to 30 percent. Congestion in Southern California led shippers to look for other gateways to use as both a backup to and as an alternative to West Coast gateways. This trend was accelerated during the lockout of ILWU union workers in October 2002, through the congestion of 2005, and into the present. High population growth rates in the southern states have also increased the efficiency of using southern ports as international gateways. A substantial number of large distribution centers have been constructed around Savannah, Georgia and other ports, which has lead to increasing volumes of containers using East Coast ports, as well as Gulf Coast ports.

The biggest impediment to growth in the Asia-East Coast container trade is the Panama Canal: the canal is reaching capacity in the number of ships that can pass through it daily, and new container ships are too big for the current dimensions of the locks. Until recently, most of the container fleet was built to the "Panamax" standard of 106 feet of beam and 965 feet of length. The new "post-Panamax" ships are up to 150 feet wide and 1,200 feet long, and these are increasingly dominating the Asian-U.S. trade. The Panama Canal Authority has embarked upon a plan to upgrade the canal to handle vessels up to 12,600 TEUs, which should be complete by 2014 to 2016.

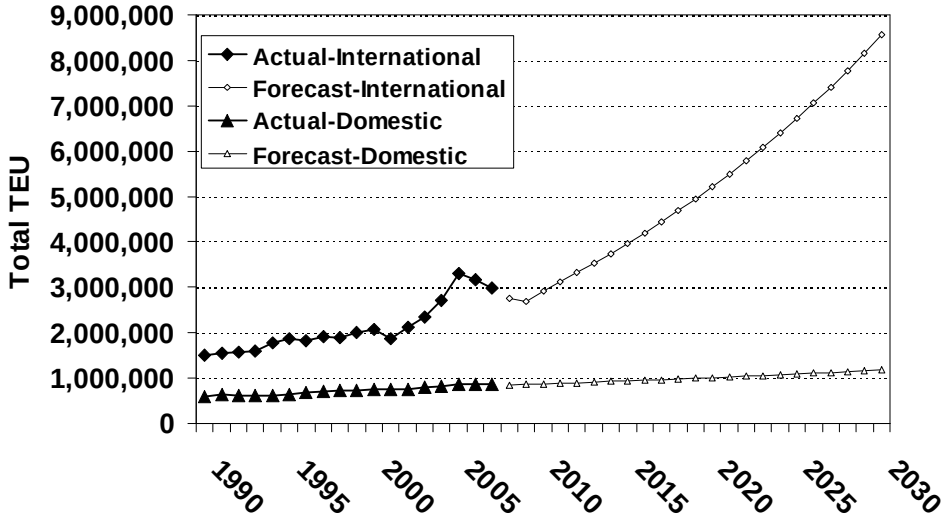
However, most East Coast ports do not enjoy the naturally deep harbors that West Coast ports have, and in order for them to be able to handle the new post-Panamax ships these ports will need to undertake a number of deepening projects.

The gain in market share by East and Gulf Coast ports has focused on those markets that are relatively close to each respective coast. For the Puget Sound ports, this has had the effect of greatly reducing the container imports bound for the northeast and southeast regions of the U.S. Most of the intermodal traffic imported via Puget Sound ports is destined for the Midwest and Mountain Central regions. In other words, much of the loss in intermodal traffic to East and Gulf Coast ports has already occurred. The major competition for Puget Sound ports is in service to the U.S. Midwest, which the ports in both California and British Columbia serve. Actions that negatively impact the relative costs of transportation via Puget Sound ports (such as container fees that have been considered by the Washington State Legislature) would reduce the volume of containers moving through Puget Sound ports.

Puget Sound Container Forecasts

Puget Sound containerized trade is projected to grow by an average of 4.1 percent per year from 2007 through 2030. Puget Sound ports handle both domestic and international containerized cargoes, and increases on the international side are expected to contribute the most to this growth rate. International containerized cargo is projected to grow by an average of 4.7 percent per year through 2030, while the domestic container trade is projected to grow by 1.3 percent per year. (See Figure 2-4.)

Figure 2-4: Puget Sound Container Forecast (1,000s of TEU)



Source: BST Associates, IHS Global Insight

Within the international sector, imports of full containers are expected to grow substantially faster than exports of full containers. As a result, the number of empty containers is projected to grow faster than either imports or exports of full containers.

The number of full containers imported through Puget Sound is currently approximately 1.6 times that of exports, but full import containers are projected to grow to 2.5 times full export containers by 2030.

Table 2-4: Container Trends and Forecast—Puget Sound (1,000 TEUs)

	International				Domestic (Full and	Total
Year	Full Imports	Full Exports	Empty	Total	Empty)	Int'l and Dom
Actual						
2002	995	615	501	2,110	750	2,860
2003	1,075	665	612	2,353	789	3,141
2004	1,277	705	723	2,705	818	3,523
2005	1,655	822	820	3,297	857	4,154
2006	1,522	775	865	3,162	866	4,028
2007	1,493	925	576	2,994	867	3,861
Forecast						
2010	1,463	1,070	393	2,926	871	3,798
2015	1,984	1,233	750	3,967	939	4,906
2020	2,609	1,397	1,212	5,219	1,011	6,230
2025	3,364	1,544	1,820	6,729	1,089	7,818
2030	4,281	1,682	2,599	8,561	1,174	9,735
Average Annual Growth Rates						
2002-2007	8.5%	8.5%	2.8%	7.2%	3.0%	6.2%
2007-2010	-0.7%	5.0%	-12.0%	-0.8%	0.2%	-0.5%
2010-2015	6.3%	2.9%	13.8%	6.3%	1.5%	5.3%
2015-2020	5.6%	2.5%	10.1%	5.6%	1.5%	4.9%
2020-2025	5.2%	2.0%	8.5%	5.2%	1.5%	4.6%
2025-2030	4.9%	1.7%	7.4%	4.9%	1.5%	4.5%
2007-2030	4.7%	2.6%	6.8%	4.7%	1.3%	4.1%

Source: BST Associates, IHS Global Insight

Lower Columbia (Oregon) Container Trends and Forecasts

The Lower Columbia container trade is centered at the Port of Portland[4]. Portland serves as a center for exporting regional containerized cargoes, such as agricultural products (e.g., frozen french fries), forest products, and other commodities. However, import traffic has increased in recent years and is now approximately equal to exports.

Portland generally does not serve as an import center for discretionary intermodal containers in the way that the Puget Sound and Southern California ports do. In other words, Portland does not currently handle a large number of containers that originate or terminate in other regions, such as the upper Midwest. However, the recent construction of distribution centers in the Portland market, combined with efficient rail facilities, has attracted more of this type of cargo.

Portland's local container market consists of an area including the state of Oregon, southern Idaho, and the barge system serving Southeast Washington and Northern Idaho. Products in this market area can move either via Columbia River ports (primarily the Port of Portland) or container ports in Puget Sound (primarily Seattle and Tacoma). Portland's share of the local market depends on a number of factors, including the number of containers moving to and from each country or world region, the relative frequency of service provided by ocean carriers, and relative inland transport costs, among other factors.

Container throughput at Portland peaked at 334,000 TEUs in 2003, but has fallen due to changes in carrier logistics patterns. The primary factor that impedes container traffic at the Port of Portland is the growing size of container ships and the inability of the Columbia River channel to accommodate them. The world container ship fleet is relatively new, with nearly 60 percent of the vessels less than ten years of age. In terms of capacity, nearly 70 percent of the fleet capacity is on vessels that are less than ten years old. With a typical life of 20 years, most of the fleet will be in service through the next 15 years.

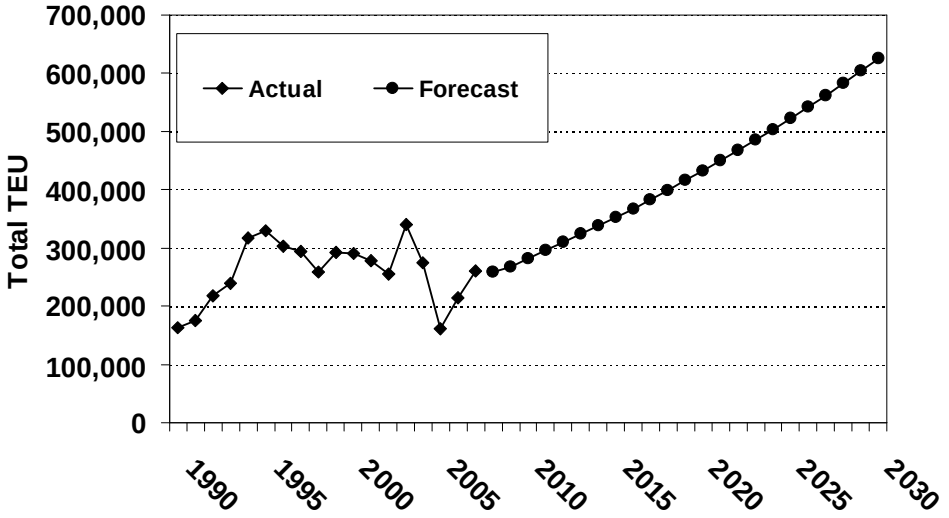
As vessels increase in capacity, their dimensions also increase. In particular, the average design draft (for fully loaded conditions) has grown from an average of 41 feet to between 44 and 46 feet. The Columbia River channel is currently being deepened from 40 feet to 43 feet of draft. Even at this increased depth, a growing portion of the container fleet will not be able to operate from Portland at maximum weight.

The deployment of larger vessels began impacting Portland in 1995, a trend that has continued. As larger vessels came on line, an increasing percentage of the cargo in Portland's hinterland began to be diverted to Puget Sound ports. However, some carriers have chosen to maximize the amount of cargo that can be exported via Portland.

Future growth in international containerized cargo at Portland will be enhanced after deepening of the Columbia River channel, which may be complete as early as November 2009. The container forecast projects that Portland could increase from 260,000 TEUs at present to 626,000 TEUs in 2030, which amounts to average annual growth of 3.9 percent during the forecast period. (See Figure 2-5 and Table 2-5.)

[4] Smaller ports in Washington State currently handle some containers via breakbulk/container liner services. Typically, the volumes are less than 1,000 TEUs per year. In the future, container throughput could increase but most growth is expected to be focused at existing load centers.

Figure 2-5: Lower Columbia Oregon Container Forecast (Total TEU)



Source: BST Associates, IHS Global Insight

Table 2-5: Full and Empty TEU (1,000s) Columbia River

Year	International Full Imports	Full Exports	Empty	Total
Actual				
2002	46	137	72	256
2003	63	147	130	340
2004	71	137	67	275
2005	61	60	39	160
2006	86	81	48	214
2007	104	102	53	260
Forecast				
2010	108	114	59	282
2015	146	132	74	352
2020	192	149	91	433
2025	247	165	110	522
2030	314	180	132	626
Average Annual Growth Rates				
2002-2007	17.6%	-5.7%	-5.8%	0.3%
2007-2010	1.2%	3.7%	3.5%	2.7%
2010-2015	6.2%	2.9%	4.7%	4.6%
2015-2020	5.6%	2.5%	4.2%	4.2%
2020-2025	5.2%	2.1%	3.9%	3.9%
2025-2030	4.9%	1.8%	3.7%	3.7%
2007-2030	4.9%	2.5%	4.0%	3.9%

Source: BST Associates, IHS Global Insight

United States Container Trends and Forecasts

Table 2-6 presents a summary forecast of container throughput via all U.S. ports (including areas noncontiguous to the lower 48 states). Container throughput increased from 34.5 million TEUs in 2002 to nearly 45.0 million TEUs in 2007 or at 5.4 percent per year. Long-term growth is expected to average 4.3 percent per year from 2007, to 2030, with container volumes reaching 117.6 million TEUs in 2030.

Table 2-6: Container Trends and Forecast – United States (1,000 TEUs)

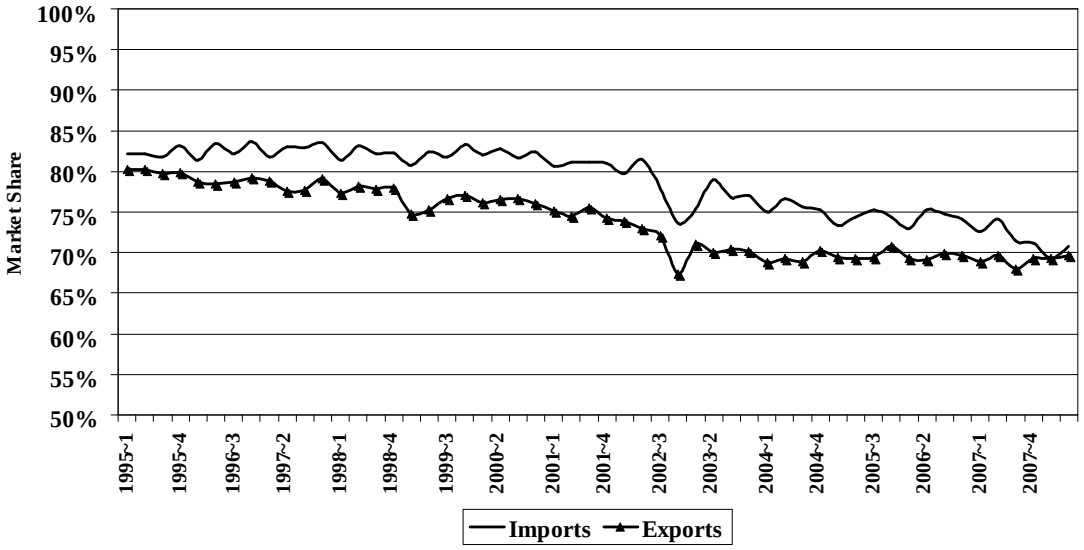
	International				Domestic (Full and	Total
Year	Full Imports	Full Exports	Empty	Total	Empty)	Int'l and Dom
Actual						
2002	13,048	5,936	10,865	29,850	4,700	34,550
2003	14,562	6,445	8,149	29,156	7,144	33,956
2004	16,828	7,385	9,540	33,753	4,902	38,655
2005	18,356	7,973	10,407	36,736	5,233	41,968
2006	19,499	8,341	11,363	39,203	5,210	44,413
2007	19,279	9,714	10,709	39,702	5,291	44,993
Forecast						
2010	19,790	13,096	9,514	42,401	5,533	47,934
2015	26,137	16,021	13,010	55,168	5,961	61,128
2020	33,789	19,222	17,317	70,328	6,421	76,749
2025	42,938	22,388	22,993	88,320	6,918	95,237
2030	53,991	25,682	30,455	110,128	7,452	117,580
Average Annual Growth Rates						
2002-2007	8.1%	10.4%	-0.3%	5.9%	2.4%	5.4%
2007-2010	0.9%	10.5%	-3.9%	2.2%	1.5%	2.1%
2010-2015	5.7%	4.1%	6.5%	5.4%	1.5%	5.0%
2015-2020	5.3%	3.7%	5.9%	5.0%	1.5%	4.7%
2020-2025	4.9%	3.1%	5.8%	4.7%	1.5%	4.4%
2025-2030	4.7%	2.8%	5.8%	4.5%	1.5%	4.3%
2007-2030	4.6%	4.3%	4.6%	4.5%	1.5%	4.3%

Source: BST Associates, IHS Global Insight

Pacific Northwest Market Share

Asian imports represent the greatest opportunity for growth in container volumes via Puget Sound ports. As shown in Figure 2-6, U.S. West Coast ports have seen declining market shares of both imports to and exports from Asia. The losses began in 2000 but accelerated after the coastwise ILWU lockout in 2002, and were further exacerbated by the congestion in Southern California in late 2004. The market share of exports began to stabilize in 2003, but market share of imports continued to decline. The diverted cargo has shifted to non-U.S. ports on the West Coast (primarily Vancouver, BC and Prince Rupert, BC) and to East and Gulf Coast ports.

Figure 2-6: U.S. West Coast Market Share of Asian Imports



Source: BST Associates, PIERS

Much of the diversion away from the Pacific Northwest has already occurred. Currently, of the Asian cargo imported through Pacific Northwest ports, approximately one-third is consumed in the Pacific Northwest (Washington and Oregon) and the remaining two-thirds is transported beyond. Approximately 60 percent of the Asian imports are transported by rail in ocean containers to other U.S. regions, including

- 87 percent to Midwest.
- One percent to South Central.
- Two percent to Southeast.
- 10 percent to Northeast.

The remaining volumes are trucked or railed in domestic containers to other regions. Of particular importance, an increasing share of the international cargo will be transloaded from ocean containers into domestic containers. In fact, the volume of originating intermodal traffic that moved in ocean containers peaked in 2005 in the Pacific Northwest and in 2006 in the Pacific Southwest. At the same time, the number of domestic boxes moving on intermodal rail services has increased significantly in the Pacific Southwest, and is also poised to follow suit in the Pacific Northwest.

Several factors induce shippers and carriers to transload cargo from ocean containers into domestic containers. Empty outbound containers are an increasing problem for shipping lines, due to an imbalance between full inbound (import) and full outbound (export) containers. This imbalance results in higher costs to the shipping lines, because they must bear the transportation cost of returning the empty containers from inland destinations. It can also impact the availability of containers at overseas load ports. Some ocean carriers have responded to this situation by providing more favorable rates from port to port (e.g., Hong Kong to Seattle or Tacoma) compared to inland point rates (e.g., Hong Kong through Seattle or Tacoma to Chicago). In addition, other carriers have limited the number of inland points that they serve.

The rate differentials and reduced inland points place the responsibility for managing the inland transportation costs on the importer. Importers have responded by accepting marine containers at transload facilities near the ports, transloading the cargo into domestic containers, and then trucking

the empty container back to the ocean container terminal. This can result in cost savings on the inland route. For example, the contents of 1.4 40-foot ocean containers can be loaded into one 53-foot domestic container, resulting in lower costs per cubic foot of cargo.

In addition to saving money on inland moves, transloading cargo near the ocean container terminal provides retailers with the flexibility they need to match import volumes with regional demand. Under this scenario, retailers receive waterborne cargo with no specified inland destination upon entry, which is then handled at a transload facility.

Because of the expected growth in domestic intermodal shipping, there is a greater need for domestic rail intermodal yards (such as the new UP domestic yard at Tacoma) as well as the development of additional crossdock and transload capacity.

Breakbulks

Overall Trends and Forecasts

For both Puget Sound and the Lower Columbia River, breakbulk traffic is forecast to grow more slowly than container traffic through the year 2030. Puget Sound breakbulk traffic is projected to grow from 1.1 million metric tons in 2007 to around 1.4 million metric tons in 2030, which represents average annual growth of 0.9 percent. In contrast, Puget Sound breakbulk traffic decreased by an average of -0.2 percent per year between 2002 and 2007.

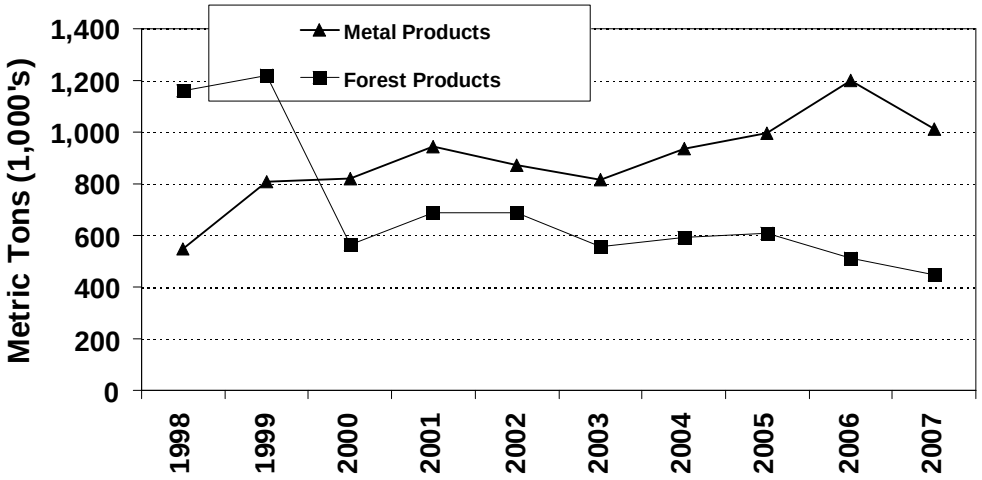
Breakbulk trade for Washington Columbia River ports is projected to increase an average of 1.2 percent per year between 2007 and 2030, with most of the growth due to imports (particularly imports of forest products and metal products). Total Washington (Columbia River) breakbulk volume is forecast to grow from 1.2 million metric tons in 2007 to 1.6 million metric tons in 2030. For Oregon ports, growth is projected to average 1.1 percent per year, climbing from 1.1 million metric tons in 2007 to 1.4 million tons in 2030.

Historically, the major commodity groups moved in breakbulk form to and from Pacific Northwest ports have included apples and other fruit, metals, and forest products. Some cargoes that move in breakbulk form can also move in containers (so-called “swing” cargoes), and differences in pricing between the two modes can lead to cargo shifting from one to the other, while others have moved completely to containers. For example, apples were at one time one of the most important breakbulk cargoes, but they have essentially become 100 percent containerized.

Although a number of factors influence whether swing cargoes are shipped in breakbulk or containerized form, such as westbound trans-Pacific container rates, frequency of sailings and the size of overseas orders, price is probably the most significant factor. Shipping lines have added so much container ship capacity to satisfy demand for U.S. imports from Asia that there was substantial excess westbound capacity. This resulted in a decrease in westbound container rates, which attracted breakbulk swing cargoes.

Another general trend impacting breakbulk cargoes has been a continuing decline in exports of forest products. This decline has been offset by the increase in imports of metal products, as shown in Figure 2-7.

Figure 2-7: General Cargo Trends



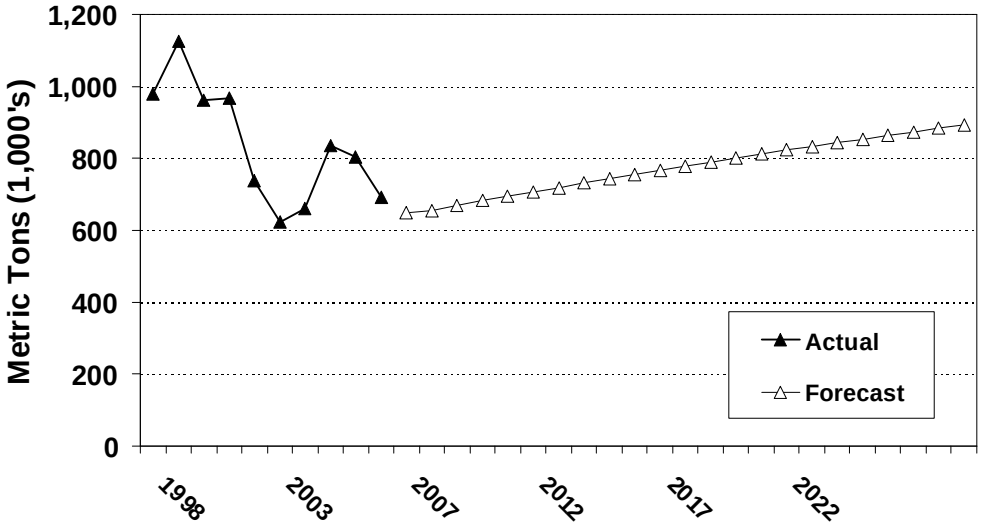
Source: BST Associates using MARAD data

Puget Sound

Puget Sound breakbulk traffic has fallen sharply due to containerization, to a shift to overland transport from Canada, and to structural changes in key producers. Forest products, long one of the key export breakbulks, now accounts for 33 percent of Puget Sound breakbulk exports, down from 68 percent in 1997. Likewise, breakbulk exports have declined in correlation with a decline in production of aluminum at regional smelters.

Puget Sound breakbulk trade is projected to grow from 1.1 million tons in 2007 to 1.4 million tons in 2030[5]. (See Figure 2-8 and Table 2-7.)

Figure 2-8: Puget Sound Breakbulk Forecast



Source: BST Associates, IHS Global Insight

[5] Breakbulk estimates have been revised to include military cargo volumes and are not directly comparable with previous forecasts.

Table 2-7: Breakbulk Trends and Forecast—Puget Sound (1,000 Metric Tons)

Year	Imports	Exports	Domestic Receipts	Domestic Shipments	Total
Actual					
2002	394	344	-	397	1,135
2003	367	254	-	460	1,082
2004	418	241	-	432	1,091
2005	542	292	-	518	1,352
2006	498	306	-	461	1,265
2007	446	245	-	436	1,127
Forecast					
2010	378	292	-	449	1,119
2015	418	313	-	472	1,203
2020	457	333	-	486	1,276
2025	494	350	-	492	1,336
2030	529	365	-	497	1,391
Average Annual Growth Rates					
2002-2007	2.5%	-6.5%		1.9%	-0.2%
2007-2010	-5.3%	5.9%		1.0%	-0.2%
2010-2015	2.0%	1.5%		1.0%	1.5%
2015-2020	1.8%	1.2%		0.6%	1.2%
2020-2025	1.6%	1.0%		0.3%	0.9%
2025-2030	1.4%	0.9%		0.2%	0.8%
2007-2030	0.7%	1.7%		0.6%	0.9%

Source: BST Associates, IHS Global Insight

Lower Columbia

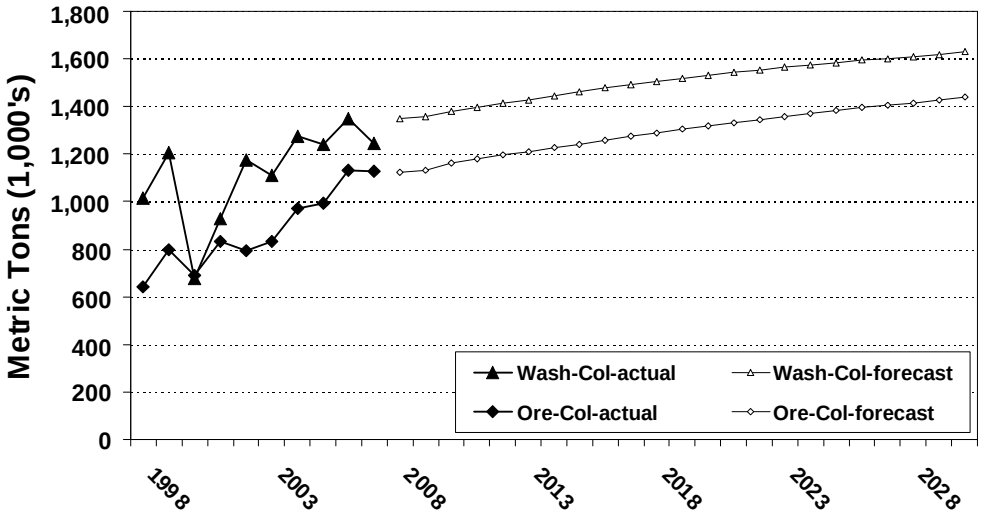
Between 2002 and 2007, breakbulk cargo volumes saw sustained growth along both sides of the Columbia River. At Washington ports breakbulk traffic increased from 1.1 million tons in 2002 to 1.2 million tons in 2007. At Oregon ports breakbulk traffic increased from approximately 800,000 tons in 2002 to nearly 1.2 million tons in 2007.

On both sides of the river imports of metal products accounted for most of the increased breakbulk volumes. At Oregon ports imports of breakbulk metal products increased by 400,000 tons and at Washington ports by 70,000 tons. Imports of forest products decreased in Washington by approximately 30,000 tons and in Oregon ports by 60,000 tons.

Forest products continue to be the largest export breakbulk commodity for Columbia River ports, and nearly all of this moves through Washington ports. The volume of export breakbulk forest products moving through Washington Columbia River ports fell by 110,000 tons between 2002 and 2007.

Future breakbulk growth for Columbia River ports will come primarily from imports of metal products. The main drivers of these metal imports are the Steelscape plant in Kalama and Oregon Steel in Portland, as well as steel products bound for inland U.S. points. In addition, Columbia River ports have also attracted components for wind generation systems. These imports are expected to increase as more funding is secured for alternative sources of power in the U.S. (See Figure 2-9, Table 2-8 and Table 2-9.)

Figure 2-9: Lower Columbia Breakbulk Forecast



Source: BST Associates, IHS Global Insight

Table 2-8: Breakbulk Trends and Forecast—Columbia River Washington (1,000 Metric Tons)

Year	Imports	Exports	Domestic Receipts	Domestic Shipments	Total
Actual					
2002	689	337	-	148	1,174
2003	656	286	-	169	1,111
2004	760	307	-	208	1,275
2005	724	269	-	248	1,240
2006	867	255	-	225	1,347
2007	786	247	-	213	1,246
Forecast					
2010	901	258	-	219	1,378
2015	958	272	-	230	1,461
2020	1,012	282	-	237	1,531
2025	1,056	288	-	240	1,584
2030	1,092	294	-	243	1,629
Average Annual Growth Rates					
2002-2007	2.7%	-6.0%	-	7.5%	1.2%
2005-2010	4.5%	-0.8%	-	-2.4%	2.1%
2010-2015	1.3%	1.1%	-	1.0%	1.2%
2015-2020	1.1%	0.7%	-	0.6%	0.9%
2020-2025	0.9%	0.4%	-	0.3%	0.7%
2025-2030	0.7%	0.4%	-	0.2%	0.6%
2007-2030	1.2%	0.6%	-	0.5%	1.0%

Source: BST Associates, IHS Global Insight

Table 2-9: Breakbulk Trends and Forecast—Columbia River Oregon (1,000 Metric Tons)

Year	Imports	Exports	Domestic Receipts	Domestic Shipments	Total
Actual					
2002	694	78	-	24	795
2003	775	57	-	2	833
2004	917	53	-	-	970
2005	946	72	-	7	1,025
2006	1,070	60	-	-	1,130
2007	1,071	95	-	-	1,166
Forecast					
2010	1,091	69	-	-	1,161
2015	1,169	73	-	-	1,242
2020	1,242	77	-	-	1,319
2025	1,304	80	-	-	1,383
2030	1,357	82	-	-	1,439
Average Annual Growth Rates					
2002-2007	9.1%	4.0%	-	-	7.9%
2005-2010	2.9%	-0.7%	-	-	2.5%
2010-2015	1.4%	1.2%	-	-	1.4%
2015-2020	1.2%	0.9%	-	-	1.2%
2020-2025	1.0%	0.7%	-	-	1.0%
2025-2030	0.8%	0.6%	-	-	0.8%
2007-2030	0.8%	-0.5%	-	-	0.8%

Source: BST Associates, IHS Global Insight

Commodity Specific Analysis

Commodity-specific findings impacting Washington port movements of breakbulk and neobulk cargoes include the following highlights.

Metal Products

Metal product imports include products for local construction projects (structural steel plates and fabricated products like fencing and siding) as well as products (coils et al.) shipped by rail to inland customers. Due to an expected decline in U.S. production of automobiles and white goods, imports destined for inland manufacturers are likely to be reduced. Construction projects are projected to increase at approximately the rate of population growth. Increased volumes of products from wind turbine projects are expected to increase as funding becomes more secure.

Forest Products

Breakbulk exports of lumber are not projected to climb back to the historically high levels of the late 1980s and early 1990s during the time period covered by this forecast. Breakbulk exports of forest products through Washington State ports are projected to rise by just 58,000 tons between 2007 and 2030.

Breakbulk pulp and paper exports have also decreased from prior levels. In addition, a larger share of these products are moving in containers. (See Tables 2-10 through 2-15.)

Table 2-10: Breakbulk Import Details—Puget Sound (1,000 Metric Tons)

Year	Metal Products	Forest Products	Other	Total
Actual				
2002	282	102	11	394
2003	264	85	18	367
2004	278	122	18	418
2005	354	168	20	542
2006	328	148	22	498
2007	310	113	22	446
Forecast				
2010	256	102	20	378
2015	274	122	22	418
2020	290	144	23	457
2025	304	167	23	494
2030	316	190	23	529
Average Annual Growth Rates				
2002-2007	1.9%	2.2%	14.9%	2.5%
2005-2010	-6.3%	-9.4%	0.0%	-6.9%
2010-2015	1.4%	3.6%	1.9%	2.0%
2015-2020	1.2%	3.3%	0.9%	1.8%
2020-2025	0.9%	3.0%	0.0%	1.6%
2025-2030	0.8%	2.6%	0.0%	1.4%
2007-2030	0.1%	1.8%	0.2%	0.6%

Source: BST Associates, IHS Global Insight

Table 2-11: Breakbulk Export Details—Puget Sound
(1,000 Metric Tons)

Year	Metal Products	Forest Products	Other	Total
Actual				
2002	69	195	79	344
2003	71	130	54	254
2004	76	119	46	241
2005	100	125	67	292
2006	132	85	89	306
2007	110	81	55	245
Forecast				
2010	147	85	60	292
2015	156	89	68	313
2020	164	93	76	333
2025	171	95	84	350
2030	176	97	92	365
Average Annual Growth Rates				
2002-2007	9.6%	-16.2%	-7.0%	-6.5%
2005-2010	8.1%	-7.6%	-2.2%	0.0%
2010-2015	1.2%	1.1%	2.5%	1.5%
2015-2020	1.0%	0.7%	2.2%	1.2%
2020-2025	0.8%	0.5%	2.0%	1.0%
2025-2030	0.6%	0.4%	1.8%	0.9%
2007-2030	1.7%	0.7%	1.9%	1.4%

Source: BST Associates, IHS Global Insight

Table 2-12: Breakbulk Import Details—Columbia River Washington (1,000 Metric Tons)

Year	Metal Products	Forest Products	Other	Total
Actual				
2002	523	72	94	689
2003	481	72	103	656
2004	582	75	104	760
2005	542	72	110	724
2006	741	55	71	867
2007	591	42	153	786
Forecast				
2010	724	38	139	901
2015	774	45	139	958
2020	822	53	137	1,012
2025	861	61	134	1,056
2030	894	70	128	1,092
Average Annual Growth Rates				
2002-2007	2.5%	-10.3%	10.2%	2.7%
2005-2010	6.0%	-12.2%	-3.1%	4.5%
2010-2015	1.4%	3.6%	0.0%	1.3%
2015-2020	1.2%	3.3%	-0.2%	1.1%
2020-2025	0.9%	3.0%	-0.5%	0.9%
2025-2030	0.8%	2.6%	-0.8%	0.7%
2007-2030	1.5%	1.8%	-0.6%	1.2%

Source: BST Associates, IHS Global Insight

Table 2-13: Breakbulk Export Details—Columbia River Washington (1,000 Metric Tons)

Year	Forest Products	Other	Total
Actual			
2002	321	16	337
2003	270	16	286
2004	276	31	307
2005	244	25	269
2006	224	31	255
2007	212	35	247
Forecast			
2010	222	36	258
2015	234	38	272
2020	243	39	282
2025	249	39	288
2030	254	40	294
Average Annual Growth Rate			
2002-2007	-8.0%	16.9%	-6.0%
2005-2010	-1.9%	7.6%	-0.8%
2010-2015	1.1%	1.1%	1.1%
2015-2020	0.7%	0.5%	0.7%
2020-2025	0.5%	0.0%	0.4%
2025-2030	0.4%	0.5%	0.4%
2007-2030	0.7%	0.5%	0.6%

Source: BST Associates, IHS Global Insight

Table 2-14: Breakbulk Import Details—Columbia River Oregon (1,000 Metric Tons)

Year	Metal Products	Forest Products	Other	Total
Actual				
2002	589	92	12	694
2003	695	65	15	775
2004	855	37	26	917
2005	891	20	35	946
2006	1,029	31	10	1,070
2007	1,012	24	35	1,071
Forecast				
2010	1,033	21	37	1,091
2015	1,105	26	38	1,169
2020	1,173	30	39	1,242
2025	1,229	35	40	1,304
2030	1,276	40	41	1,357
Average Annual Growth Rates				
2002-2007	11.4%	-23.8%	23.9%	9.1%
2005-2010	3.0%	1.7%	1.1%	2.9%
2010-2015	1.4%	3.6%	0.5%	1.4%
2015-2020	1.2%	3.3%	0.5%	1.2%
2020-2025	0.9%	3.0%	0.5%	1.0%
2025-2030	0.8%	2.6%	0.5%	0.8%
2007-2030	0.8%	1.8%	0.6%	0.8%

Source: BST Associates, IHS Global Insight

Table 2-15: Breakbulk Export Details—Columbia River Oregon (1,000 Metric Tons)

Year	Forest Products	Other	Total
Actual			
2002	15	63	78
2003	12	45	57
2004	11	42	53
2005	17	55	72
2006	37	23	60
2007	35	60	95
Forecast			
2010	46	23	69
2015	49	24	73
2020	52	25	77
2025	54	26	80
2030	56	26	82
Average Annual Growth Rates			
2002-2007	17.5%	-0.8%	4.0%
2005-2010	22.7%	-16.1%	-0.7%
2010-2015	1.2%	1.1%	1.2%
2015-2020	1.0%	0.7%	0.9%
2020-2025	0.8%	0.5%	0.7%
2025-2030	0.6%	0.4%	0.6%
2007-2030	1.7%	-2.9%	-0.5%

Source: BST Associates, IHS Global Insight

Neobulks

Automobiles

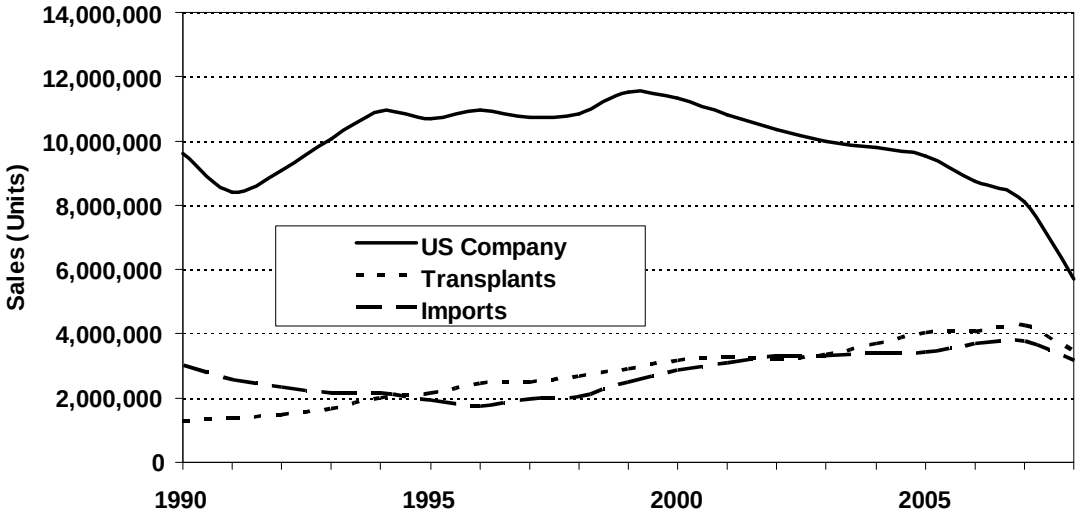
The U.S. and world auto producers are facing a significant level of excess assembly capacity. It has been estimated that a global plant utilization of 80 percent equals the equivalent of more than 100 assembly plants sitting idle. This trend is impacting the U.S. markets. In addition, the only large import markets are North America and West Europe at the present time. All other markets are dominated by local manufacturers.

In the U.S., sales by domestic producers have collapsed in recent years. In 1998, U.S. producers accounted for 70 percent of cars and light trucks sold in the U.S. By 2007, domestic producers accounted for 50 percent of U.S. sales. The decline of the U.S. auto industry has been well publicized and stems from relatively higher production costs as well as quality problems in the past. According to recent surveys, the quality of U.S. cars is comparable with imports but many Americans no longer want to own the cars being made by General Motors, Ford and Chrysler. The rise of fuel prices exacerbated the decline as the market avoided larger cars and trucks for more fuel efficient smaller cars.

As a result, foreign car manufacturers have gained significant inroads into the U.S. market. Transplants (U.S. production by foreign manufacturers) grew rapidly from 9 percent of sales in 1990 to a peak of 26 percent in 2007. Imports of fully assembled vehicles declined in volumes (and percent of sales) from 1990 to 1996 then increased to 3.7 million units representing 23 percent of U.S. sales in 2007.

Overall sales in the U.S. market fell by 25 percent in 2008 to 12.3 million units, down from 16.1 million units in 2007. However, imports and transplants continued to gain market share at the expense of U.S. domestic producers. (See Figure 2-10.)

Figure 2-10: Source of Foreign Automobiles Sold in the U.S. Market (Share of Total Market)



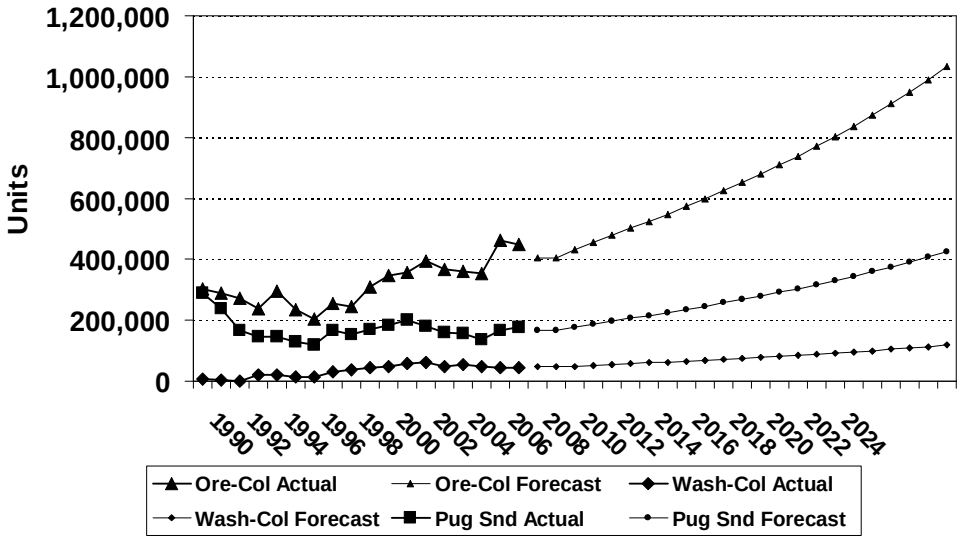
Note: "Transplants" are foreign-brand automobiles manufactured in the United States
Source: Ward's Automotive

The projections for imports of fully assembled cars is for strong growth with imports expected to grow much faster than U.S. production. Much of the growth in West Coast imports is expected to

come from Japan and Korea but there are also expected new import sources. China's rapidly growing domestic market is the primary focus of the country's manufacturers, but China has also recently tested the export waters. A state-owned Chinese company named Dongfeng has entered into a joint venture with Honda and is now exporting cars to Europe and America. DaimlerChrysler recently cut a deal with the Chinese automaker Chery, and together the companies aim to explore the U.S. market. In addition, automobile production in India is expected to rise to 1.6 million cars in 2009 and reach 4 million cars by 2017. India could also export cars to the U.S. market.

IHS Global Insight is projecting rapid growth in fully assembled auto imports, with growth averaging 3 percent to 4 percent per year throughout the forecast period. Auto imports via the Pacific Northwest (Washington and Oregon) are projected to reach 2.1 million tons or approximately 1.5 million units in 2030 up from 690,000 units in 2007. The IHS Global Insight forecast assumes that PNW ports continue to capture 15 percent of U.S. auto imports. However, changing distribution patterns in the future could strongly impact both the overall forecast and the region-specific projections. (See Figure 2-11.)

Figure 2-11: Fully Assembled Automobile Imports (Units)



Source: BST Associates, IHS Global Insight

In Puget Sound, imports (via Tacoma) grew robustly in 2002 and 2003, then declined through 2005 before increasing in 2007 to levels experienced in 2002. The forecast projects growth averaging 3.9 percent per year through 2030 with volumes reaching 424,000 units. Other ports (i.e., Grays Harbor) may play a more significant role in these imports as volumes increase.

Vancouver (Washington) has also experienced significant increases with the Subaru account through 2002 and then experienced declines in import volumes. The forecasts projects average annual growth of 4.3 percent through 2030 with volumes reaching 118,000 units in 2030.

Portland is the primary auto import center in the Pacific Northwest, and is home to many key importers, including Honda, Hyundai, and Toyota. The forecast projects average annual growth of 3.7 percent through 2030 with volumes exceeding 1.0 million units in 2030. (See Table 2-16.)

Table 2-16: Automobile Imports (1,000 Units)

Year	Puget Sound	Washington Columbia	Oregon Columbia	Pacific Northwest Total
Actual				
2002	180	61	395	636
2003	158	47	366	572
2004	157	53	359	569
2005	136	48	355	539
2006	166	43	464	673
2007	175	45	449	669
Forecast				
2010	177	49	432	658
2015	225	63	548	836
2020	280	78	681	1,038
2025	344	96	838	1,278
2030	424	118	1,032	1,574
Average Annual Growth Rates				
2002-2007	-0.6%	-5.9%	2.6%	1.0%
2007-2010	0.4%	3.2%	-1.3%	-0.5%
2010-2015	4.9%	4.9%	4.9%	4.9%
2015-2020	4.4%	4.4%	4.4%	4.4%
2020-2025	4.2%	4.2%	4.2%	4.2%
2025-2030	4.3%	4.3%	4.3%	4.3%
2007-2030	3.9%	4.3%	3.7%	3.8%

Source: BST Associates, IHS Global Insight

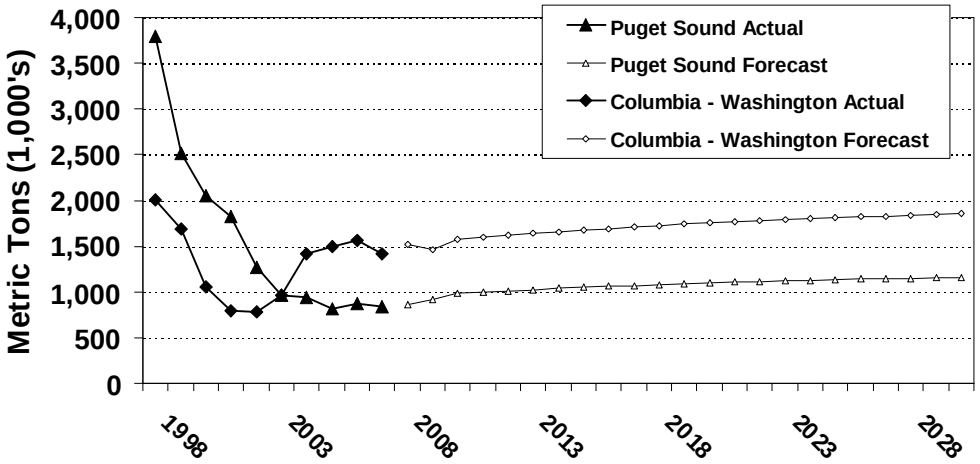
Log Exports

Log exports through Washington State ports have declined since the beginning of the 1990s. In 1990 Puget Sound, Washington Coast, and Columbia River ports exported a combined total of 11.4 million tons of logs, but by 2001 this had dropped to 1.9 million tons. On the Oregon side of the Columbia River log exports disappeared entirely, while Puget Sound/ Washington Coastal ports saw volumes fall by nearly 87 percent. Washington Columbia River ports also experienced declines, but by slightly less than 50 percent.

Environmental concerns are often blamed for the sharp drop in log exports, but other factors were at work as well, including the Asian financial crisis that substantially reduced U.S. exports to Asia. Even though this crisis has largely passed, exports to this region have not recovered. Contributing to the lack of recovery is increased competition for the Asian market from Russia, New Zealand, and South America, among other areas.

Log exports are projected to increase at an average annual rate of 0.9 percent, reaching 1.1 million tons via Puget Sound ports and 1.8 million tons via ports on the Washington side of the Columbia River. (See Figure 2-12.)

Figure 2-12: Log Export Forecast (1,000 Metric Tons)



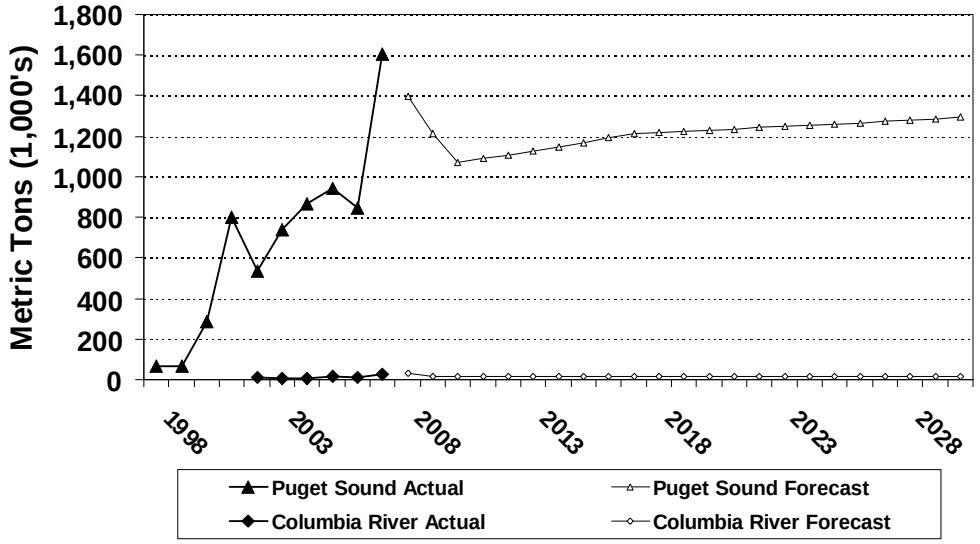
Source: BST Associates, IHS Global Insight

Log Imports

The reduction in domestic log harvest lead to a growing volume of imported logs moving into the region from Canada. Puget Sound mills are especially dependent on this source, although Columbia River mills also use Canadian timber.

Waterborne imports of logs are projected to continue growing slowly by an average of 0.3 percent per year. In Puget Sound, log imports are projected to decline in the near-term due to the economic stress on regional mills. However, beginning in 2011, imports are expected to grow, reaching 1.3 million tons in 2030. (See Figure 2-13, Table 2-17, and Table 2-18.)

Figure 2-13: Log Import Forecast (1,000 Metric Tons)



Source: BST Associates

Table 2-17: Log Exports (1,000 Metric Tons)

Year	Puget Sound	Washington Columbia	Washington State
Actual			
2002	943	1,422	2,365
2003	816	1,492	2,308
2004	870	1,563	2,433
2005	836	1,420	2,256
2006	860	1,515	2,375
2007	913	1,459	2,372
Forecast			
2010	1,012	1,617	2,629
2015	1,070	1,711	2,781
2020	1,113	1,779	2,892
2025	1,145	1,830	2,975
2030	1,171	1,872	3,043
Average Annual Growth Rates			
2002-2007	-0.6%	0.5%	0.1%
2007-2010	3.9%	2.6%	3.1%
2010-2015	1.1%	1.1%	1.1%
2015-2020	0.8%	0.8%	0.8%
2020-2025	0.6%	0.6%	0.6%
2025-2030	0.5%	0.5%	0.5%
2007-2030	0.9%	0.9%	0.9%

Source: BST Associates, IHS Global Insight

Table 2-18: Log Imports (1,000 Metric Tons)

Year	Puget Sound	Washington Columbia	Washington State
Actual			
2002	869	5	875
2003	943	15	958
2004	848	8	856
2005	1,606	28	1,634
2006	1,399	29	1,428
2007	1,212	16	1,228
Forecast			
2010	1,109	15	1,124
2015	1,212	16	1,228
2020	1,242	16	1,259
2025	1,274	17	1,291
2030	1,306	17	1,323
Average Annual Growth Rates			
2002-2007	6.9%	24.2%	7.0%
2007-2010	-7.1%	-12.1%	-7.2%
2010-2015	1.8%	1.8%	1.8%
2015-2020	0.5%	0.5%	0.5%
2020-2025	0.5%	0.5%	0.5%
2025-2030	0.5%	0.5%	0.5%
2007-2030	0.3%	0.3%	0.3%

Source: BST Associates, IHS Global Insight

Dry Bulks

The dry bulk trade in the Pacific Northwest is dominated by the export of grain and oilseeds. The volume of grain exports tends to fluctuate from year to year, but typically accounts for between 60 percent and 80 percent of all international dry bulk traffic in the region. The remaining dry bulk tonnage is made up of minerals, fertilizer, metal ores, petroleum coke, wood chips, and scrap metal.

The outlook is relatively positive for the dry bulk trade in Washington. Grain exports increased significantly during the past five years. Future projections are for slower growth. Other dry bulks are also expected to exhibit positive growth.

Grain exports through Lower Columbia River ports are projected to rise by 9 percent by the year 2030. Puget Sound exports are also forecast to grow by about 10 percent over the forecast period. Both port regions are susceptible to competition from the Mississippi River and Gulf Coast ports, although the Lower Columbia region is less exposed because of the volume of grain that is shipped to these ports by barge.

Imports of cement and minerals and exports of minerals, wood chips, and petroleum coke are also expected to exhibit modest growth.

Grain Products and Soybeans

In the Pacific Northwest, nearly all wheat and barley exports are handled through Columbia River ports. As with coarse grains, however, competition from other exporting countries is intense in the wheat and barley trade. The primary competitors for grain exported through Pacific Northwest elevators are Canada and Australia, but some former importers, including India and Pakistan, are now beginning to export to the same markets.

Much of the wheat exported through the Pacific Northwest is grown in the Upper Midwest, but the ports also handle substantial volumes of wheat grown in Eastern Washington, Oregon, Idaho, Montana, and Utah. The way that wheat moves to export elevators varies based on where it is grown. Essentially all of the wheat from the Midwest is shipped to Columbia River export elevators by rail, while Pacific Northwest wheat moves by both rail and barge. The relative importance of barge and rail transportation is explained in more detail in the following two chapters.

Wheat is primarily used for human consumption, as opposed to the coarse grains being used as a feed product for animals. Demand for human food is less affected by changes in personal income than demand for animal feed. However, exchange rates do have a strong effect on wheat sales.

In the future, questions regarding the operation, or even the continued existence, of the dams and navigational locks on the Columbia and Snake Rivers may have an impact on wheat exports. A large portion of the wheat exported from the Lower Columbia is shipped to the export elevators by barge from upriver. If barging were no longer available, wheat would necessarily move to another, more expensive mode of transport, which would affect the selling price of the grain, because barge is the lowest-cost means of transporting downriver. Given the intense competition in the world wheat market, even a small increase in the price of Pacific Northwest wheat could have a substantial negative effect on exports.

Coarse grains, including corn and sorghum, are primarily used as animal feed. Soybeans are used for animal feed and for human consumption. World competition in the coarse grain market is intense, and Washington exporters vie for sales against Brazil, Argentina, and others. Washington ports also face competition from other U.S. port regions, specifically ports on the Gulf of Mexico.

Ocean freight rate and rail freight rate differentials can cause major shifts of exports between Pacific Northwest and Gulf Coast ports.

Due to favorable conditions in recent years (including relatively lower freight rates) Washington State ports experienced rapid growth in corn exports. However, current factors mitigate against continued growth in corn exports. In particular, an increasing share of U.S. corn production will likely shift to ethanol production, reducing the volume of corn available for export. In addition, international competition from Argentina and Ukraine is expected to increase in the near-term for export sales but China is expected to become a net importer in the near-term, which could expand the export market size substantially.

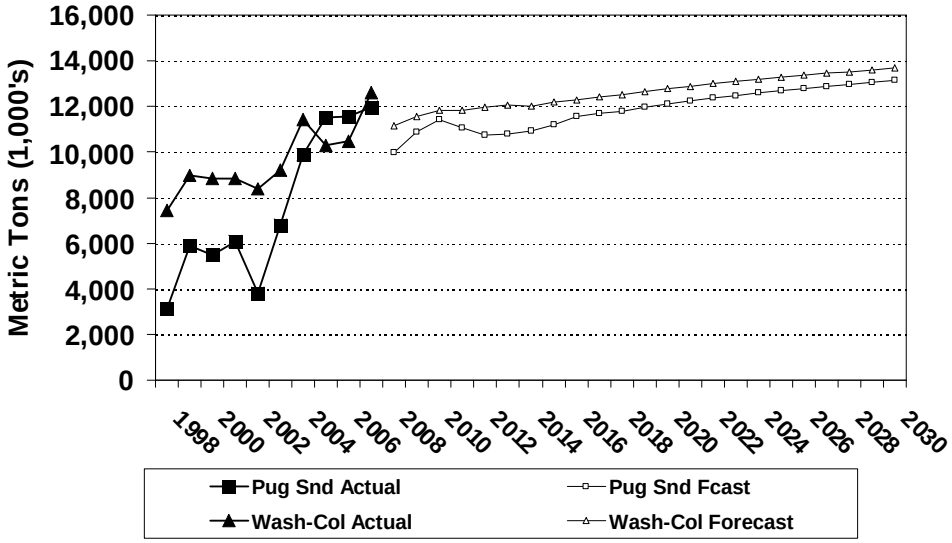
Soybean exports have also increased significantly in the last five years. There continues to be a strong demand for vegetable oils for food consumption and for protein meals used in livestock production and biodiesel. The export markets are large and growing, particularly in China. As with other crops, there is international competition (mainly from Brazil and Argentina).

Washington State ports handle a small volume of sorghum, which is grown in the Central and Southern Plains. The U.S. dominates world sorghum exports with approximately 80 percent of the market. Most of this product now goes to Mexico and Japan. The USDA expects a decline in the international market due to increased competition from Argentina and Brazil.

Puget Sound ports (Tacoma, Seattle and Grays Harbor) and Lower Columbia Washington ports are both projected to experience marginal increases in grain (and related) exports at an average annual rate of 0.3 percent over the period from 2007 to 2030. Puget Sound ports are projected to reach 13.1 million tons in 2030; Washington ports on the Lower Columbia are projected to handle 13.7 million tons in 2030.

Columbia River ports in Oregon handle very limited volumes of coarse grains. Elevators at the Ports of Seattle and Tacoma primarily handle soybeans and corn from the upper Midwest. The Kalama Export elevator in Kalama was primarily a corn export facility, but has recently handled significant quantities of wheat, soybeans, and milo, also. Elevators in Vancouver and Kalama (United Harvest) primarily handle wheat and barley. The Port of Grays Harbor has a facility (Ag Processing) for exporting Midwest soybean meal. (See Figure 2-14 and Tables 2-19 through 2-21.)

Figure 2-14: Coarse Grains/Soybean Forecast
(1,000 Metric Tons)



Source: BST Associates, IHS Global Insight

Table 2-19: Grain Exports—Puget Sound (1,000 Metric Tons)

Year	Barley	Wheat	Corn	Sorghum	Oilseeds and Feeds	Animal Feeds	Total
Actual							
2002	0	0	2,256	69	1,480	0	3,805
2003	0	0	3,755	59	2,990	0	6,804
2004	0	0	6,946	119	2,795	0	9,859
2005	0	0	7,437	205	3,860	0	11,502
2006	0	0	7,392	136	4,030	0	11,559
2007	0	0	6,875	72	5,018	0	11,965
Forecast							
2010	0	0	6,265	168	4,993	0	11,427
2015	0	0	6,265	176	4,747	0	11,187
2020	0	0	6,806	187	5,089	0	12,082
2025	0	0	6,983	191	5,521	0	12,694
2030	0	0	7,083	194	5,882	0	13,158
Average Annual Growth Rates							
2002-2007	NM	NM	25.0%	0.7%	27.7%	NM	25.8%
2005-2010	NM	NM	-3.4%	-3.8%	5.3%	NM	-0.1%
2010-2015	NM	NM	0.0%	0.8%	-1.0%	NM	-0.4%
2015-2020	NM	NM	1.7%	1.3%	1.4%	NM	1.5%
2020-2025	NM	NM	0.5%	0.4%	1.6%	NM	1.0%
2025-2030	NM	NM	0.3%	0.3%	1.3%	NM	0.7%
2007-2030	NM	NM	0.1%	3.6%	0.6%	NM	0.3%

Source: BST Associates, IHS Global Insight

Table 2-20: Grain Exports—Columbia River Washington (1,000 Metric Tons)

Year	Barley	Wheat	Corn	Sorghum	Oilseeds and Feeds	Animal Feeds	Total
Actual							
2002	86	5,336	1,433	19	1,210	297	8,381
2003	222	4,481	1,418	36	2,724	317	9,199
2004	79	6,159	2,899	68	1,970	254	11,428
2005	265	5,023	2,038	105	2,641	235	10,307
2006	93	6,115	1,827	65	2,118	245	10,463
2007	244	6,241	2,314	34	3,605	150	12,588
Forecast							
2010	263	5,532	2,420	85	3,271	248	11,819
2015	277	5,553	2,887	89	3,145	259	12,210
2020	277	5,664	3,082	95	3,381	269	12,768
2025	284	5,809	3,159	97	3,669	276	13,294
2030	288	5,893	3,204	98	3,909	279	13,673
Average Annual Growth Rates							
2002-2007	23.04%	3.18%	10.06%	12.72%	24.40%	-12.76%	8.48%
2007-2010	-0.10%	1.95%	3.50%	-4.22%	4.37%	1.09%	2.77%
2010-2015	1.00%	0.08%	3.59%	0.94%	-0.78%	0.89%	0.65%
2015-2020	0.04%	0.40%	1.32%	1.31%	1.46%	0.69%	0.90%
2020-2025	0.50%	0.51%	0.49%	0.43%	1.65%	0.51%	0.81%
2025-2030	0.28%	0.29%	0.29%	0.29%	1.28%	0.29%	0.56%
2007-2030	0.60%	-0.20%	1.17%	3.82%	0.29%	2.25%	0.30%

Source: BST Associates, IHS Global Insight

Table 2-21: Grain Exports—Columbia River Oregon (1,000 Metric Tons)

Year	Barley	Wheat	Corn	Sorghum	Oilseeds and Feeds	Animal Feeds	Total
Actual							
2002	153	3,650	51	0	47	0	3,900
2003	247	4,509	61	0	14	0	4,831
2004	101	6,049	31	0	124	0	6,305
2005	242	5,378	108	0	0	0	5,728
2006	159	4,819	67	0	1	0	5,046
2007	320	5,594	0	0	78	0	5,992
Forecast							
2010	327	5,097	0	0	41	0	5,465
2015	354	5,075	0	0	50	0	5,480
2020	358	5,181	0	0	56	0	5,594
2025	367	5,316	0	0	61	0	5,744
2030	372	5,393	0	0	65	0	5,829
Average Annual Growth Rates							
2002-2007	15.95%	8.92%	NM	NM	NM	NM	8.97%
2007-2010	6.22%	-1.07%	NM	NM	NM	NM	-0.93%
2010-2015	1.60%	-0.08%	NM	NM	NM	NM	0.05%
2015-2020	0.18%	0.41%	NM	NM	NM	NM	0.41%
2020-2025	0.52%	0.52%	NM	NM	NM	NM	0.53%
2025-2030	0.29%	0.29%	NM	NM	NM	NM	0.30%
2007-2030	0.54%	-0.13%	NM	NM	NM	NM	-0.10%

Source: BST Associates, IHS Global Insight

Bulk Cargoes (Excluding Grain)

Puget Sound

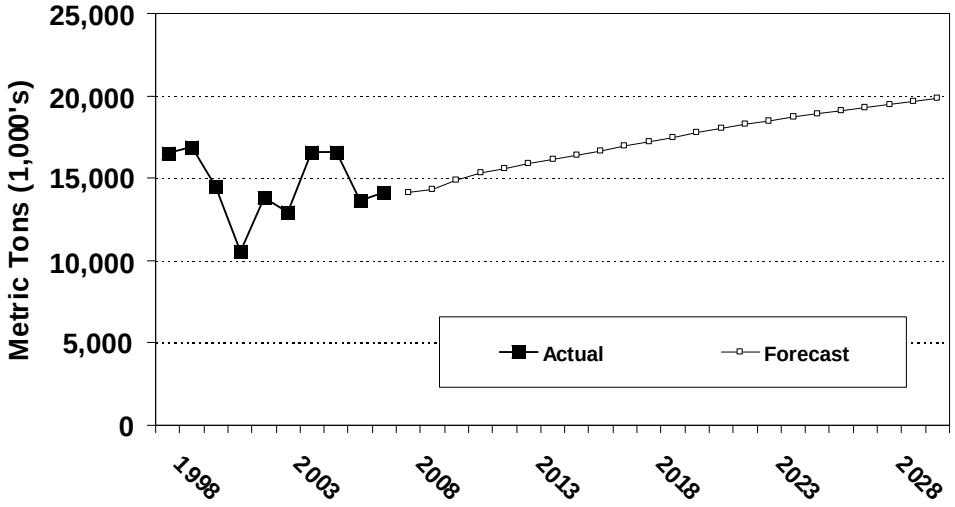
Key commodities at Puget Sound/Coast ports include scrap, wood chips, sand and gravel, cement, and gypsum. Much of the traffic in sand and gravel and other aggregates is a domestic move, and involves barging from quarries on Lummi Island, Dupont, Mats Mats, and possibly from Maury Island in the future, to plants in Seattle, Tacoma, Everett, and Bellingham among others. In addition, some of this type of commodity is imported by barge from Canada, most notably limestone for concrete manufacturing. As with other high volume, high weight, low cost commodities, barge transportation provides the least expensive means of transportation. This type of commodity also moves by rail, but in much smaller volumes.

Wood chips were historically the highest-volume export commodity, but a large share of the recent sharp decline in dry bulk exports is due to falling wood chip exports. From 1997 through 2002 exports of wood chips declined by nearly 420,000 metric tons, and are not expected to recover.

Limestone is mined on Texada Island in Canada and then shipped to plants in Seattle and Tacoma, while gypsum from Baja Mexico is shipped to wallboard plants in Seattle.

As shown in Figure 2-15 and Table 2-22, the forecast for Puget Sound dry bulks projects average annual growth of 1.4 percent per year, reaching 20.0 million tons in 2030. Most of the growth in imports will be from increases in minerals and non-metallic mineral manufactures, while most of the growth in exports will come from scrap metals and chemicals. A new facility in Everett is coming online to handle cement imports (LeHigh Cement Company).

Figure 2-15: Puget Sound Dry Bulk Forecast
(1,000 Metric Tons)



Source: BST Associates, IHS Global Insight

Table 2-22: Dry Bulk Trends and Forecast—Puget Sound (1,000 Metric Tons)

Year	Imports	Exports	Domestic Receipts	Domestic Shipments	Total
Actual					
2002	6,338	1,075	2,930	3,838	14,181
2003	5,657	1,195	2,840	3,485	13,177
2004	7,886	1,517	3,514	4,153	17,070
2005	7,542	1,552	3,668	4,350	17,112
2006	7,699	1,349	2,247	2,831	14,127
2007	6,960	2,323	2,289	3,048	14,620
Forecast					
2010	6,433	2,403	2,834	3,698	15,369
2015	7,370	2,565	3,037	3,975	16,947
2020	8,192	2,708	3,225	4,220	18,344
2025	8,934	2,811	3,382	4,417	19,545
2030	9,514	2,887	3,522	4,585	20,508
Average Annual Growth Rates					
2002-2007	1.9%	16.7%	-4.8%	-4.5%	0.6%
2007-2010	-3.1%	9.1%	-5.0%	-3.2%	-2.1%
2010-2015	2.8%	1.3%	1.4%	1.5%	2.0%
2015-2020	2.1%	1.1%	1.2%	1.2%	1.6%
2020-2025	1.8%	0.7%	1.0%	0.9%	1.3%
2025-2030	1.3%	0.5%	0.8%	0.7%	1.0%
2007-2030	1.4%	0.9%	1.9%	1.8%	1.5%

Source: BST Associates, IHS Global Insight

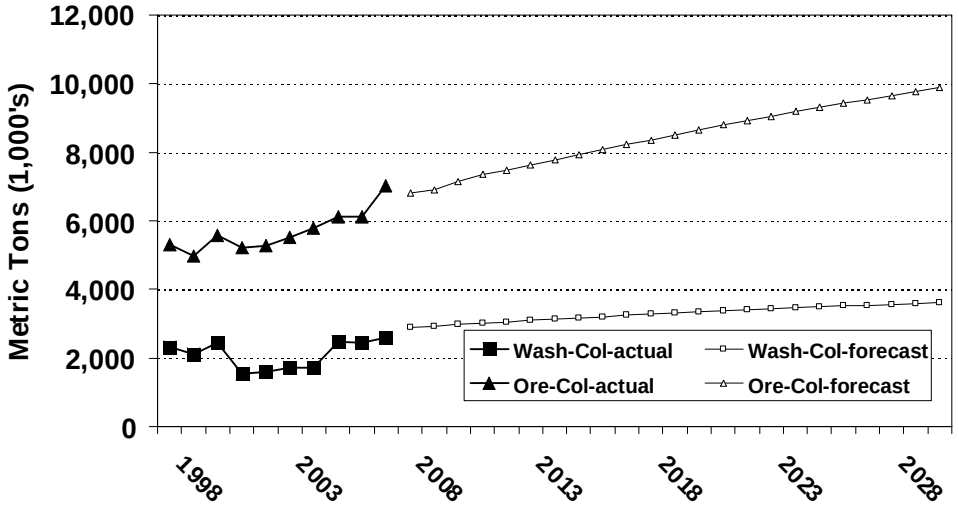
Lower Columbia

Non-grain dry bulk exports on the Lower Columbia include: minerals, ores, chemicals and fertilizers, and petroleum by-products (i.e., petroleum coke). Most of the inorganic chemicals volume is made up of exports of soda ash, which is mined in Wyoming and exported via Lower Columbia River ports (mainly Portland). Portland also exports potash mined in Saskatchewan. Copper concentrates from Montana are exported via the Port of Vancouver. Petroleum coke is produced at the refineries on Puget Sound then shipped by rail to Longview for export.

Alumina was a major component of the dry bulks handled at Lower Columbia River ports, but several aluminum smelters have either closed permanently or curtailed operations due to higher power costs and difficult market conditions.

Overall, dry bulk exports from Washington Columbia River ports are projected to grow from 3.2 million tons in 2007 to 4.3 million tons in 2030, or at 1.3 percent per year. Exports form Oregon Columbia River ports are projected to grow by 1.6 percent per year, from 6.5 million tons in 2007 to 9.5 million tons in 2030. (See Figure 2-16 and Tables 2-23 through 2-30.)

Figure 2-16: Columbia River Dry Bulk Forecast (1,000 Metric Tons)



Source: BST Associates, IHS Global Insight

Table 2-23: Dry Bulk Trends and Forecast—Columbia River Washington (1,000 Metric Tons)

Year	Imports	Exports	Domestic Receipts	Domestic Shipments	Total
Actual					
2002	515	986	248	455	2,204
2003	474	1,369	158	243	2,243
2004	826	1,510	149	56	2,541
2005	1,004	1,570	244	249	3,067
2006	1,061	1,520	250	229	3,061
2007	1,029	1,711	208	266	3,215
Forecast					
2010	1,197	1,996	194	315	3,701
2015	1,227	2,113	234	337	3,911
2020	1,248	2,215	276	357	4,096
2025	1,266	2,287	314	374	4,241
2030	**1,281**	2,339	347	388	4,355
Average Annual Growth Rates					
2002-2007	14.8%	11.7%	-3.4%	-10.1%	7.8%
2007-2010	3.6%	4.9%	-4.5%	4.8%	3.8%
2010-2015	0.5%	1.1%	3.8%	1.4%	1.1%
2015-2020	0.3%	0.9%	3.4%	1.2%	0.9%
2020-2025	0.3%	0.6%	2.6%	0.9%	0.7%
2025-2030	0.2%	0.5%	2.0%	0.7%	0.5%
2007-2030	1.0%	1.4%	2.2%	1.6%	1.3%

Notes: Domestic receipts are wood chips only, domestic shipments are primarily internal
Source: BST Associates, IHS Global Insight

Table 2-24: Dry Bulk Trends and Forecast—Columbia River Oregon (1,000 Metric Tons)

Year	Imports	Exports	Domestic Receipts	Domestic Shipments	Total
Actual					
1997	1,557	3,783			5,340
1998	1,628	3,632			5,261
1999	1,901	3,765			5,666
2000	2,302	3,941			6,243
2001	2,461	3,515			5,977
2002	1,852	4,704			6,556
Forecast					
2005	1,808	5,046			6,854
2010	2,075	5,520			7,594
2015	2,334	5,976			8,310
2020	2,556	6,397			8,953
2025	2,729	6,800			9,528
Average Annual Growth Rates					
1997-2002	3.5%	4.5%			4.2%
2000-2005	-4.7%	5.1%			1.9%
2005-2010	2.8%	1.8%			2.1%
2010-2015	2.4%	1.6%			1.8%
2015-2020	1.8%	1.4%			1.5%
2020-2025	1.3%	1.2%			1.3%
2002-2025	1.7%	1.6%			1.6%

Notes: Domestic receipts are wood chips only, domestic shipments are primarily internal
Source: BST Associates, IHS Global Insight

Table 2-25: Dry Bulk Imports Details—Puget Sound (1,000 Metric Tons)

Year	Wood Chips	Minerals	Ores	Scrap Metal	Non-Metallic Min Manuf.	Other	Total
Actual							
2002	330	2,687	170	0	2,865	286	6,338
2003	318	2,377	273	14	2,473	202	5,657
2004	98	3,506	206	147	3,613	316	7,886
2005	170	3,309	243	29	3,428	364	7,542
2006	75	3,392	205	162	3,500	365	7,699
2007	111	3,431	250	560	2,278	330	6,960
Forecast							
2010	101	3,106	206	486	2,230	305	6,433
2015	117	3,634	206	509	2,554	349	7,370
2020	134	4,174	206	523	2,766	388	8,192
2025	148	4,627	206	579	2,950	423	8,934
2030	159	4,967	206	622	3,109	451	9,514
Average Annual Growth Rates							
2002-2007	-19.7%	5.0%	8.1%		-4.5%	2.9%	1.9%
2007-2010	-9.9%	-1.3%	-3.2%	75.7%	-8.2%	-3.5%	-3.1%
2010-2015	2.9%	3.2%	0.0%	1.0%	2.8%	2.8%	2.8%
2015-2020	2.8%	2.8%	0.0%	0.5%	1.6%	2.1%	2.1%
2020-2025	2.1%	2.1%	0.0%	2.1%	1.3%	1.8%	1.8%
2025-2030	1.4%	1.4%	0.0%	1.4%	1.1%	1.3%	1.3%
2007-2030	1.6%	1.6%	-0.8%	0.5%	1.4%	1.4%	1.4%

Source: BST Associates, IHS Global Insight

Table 2-26: Dry Bulk Exports Details—Puget Sound (1,000 Metric Tons)

Year	Wood Chips	Minerals	Scrap Metal	Chemicals and Fertilizers	Petroleum Byproducts	Other	Total
Actual							
2002	367	23	249	79	297	60	1,075
2003	351	12	421	26	323	62	1,195
2004	449	44	555	44	242	183	1,517
2005	454	38	640	52	200	169	1,552
2006	220	90	515	76	317	132	1,349
2007	327	459	978	102	226	231	2,323
Forecast							
2010	376	576	812	110	297	232	2,403
2015	406	617	877	120	314	232	2,565
2020	429	654	942	130	322	232	2,708
2025	443	685	986	139	326	232	2,811
2030	451	713	1,017	148	327	232	2,887
Average Annual Growth Rates							
2002-2007	-2.3%	82.5%	31.4%	5.3%	-5.3%	31.0%	16.7%
2007-2010	-3.7%	72.2%	4.9%	16.2%	8.2%	6.5%	9.1%
2010-2015	1.5%	1.4%	1.5%	1.8%	1.1%	0.0%	1.3%
2015-2020	1.1%	1.2%	1.5%	1.6%	0.5%	0.0%	1.1%
2020-2025	0.6%	0.9%	0.9%	1.4%	0.2%	0.0%	0.7%
2025-2030	0.4%	0.8%	0.6%	1.2%	0.1%	0.0%	0.5%
2007-2030	1.4%	1.9%	0.2%	1.6%	1.6%	0.0%	0.9%

Source: BST Associates, IHS Global Insight

Table 2-27: Dry Bulk Imports Details—Columbia River Washington (1,000 Metric Tons)

Year	Minerals	Ores	Chemicals and Fertilizers	Non Met Min Manuf	Other	Total
Actual						
2002	0	0		0	515	515
2003	15	0		67	392	474
2004	0	67		112	647	826
2005	0	210		97	698	1,004
2006	0	244		119	699	1,061
2007	4	300		54	671	1,029
Forecast						
2010	2	350		64	780	1,197
2015	3	350		73	801	1,227
2020	3	350		79	815	1,248
2025	4	350		84	827	1,266
2030	4	350		89	838	1,281
Average Annual Growth Rates						
2002-2007	N/M	N/M	N/M	N/M	5.4%	14.8%
2007-2010	N/M	10.8%	N/M	-7.9%	2.3%	3.6%
2010-2015	7.5%	0.0%	N/M	2.6%	0.5%	0.5%
2015-2020	3.3%	0.0%	N/M	1.6%	0.4%	0.3%
2020-2025	2.1%	0.0%	N/M	1.3%	0.3%	0.3%
2025-2030	1.4%	0.0%	N/M	1.1%	0.3%	0.2%
2007-2030	-0.1%	0.7%	N/M	2.2%	1.0%	1.0%

Source: BST Associates, IHS Global Insight

Table 2-28: Dry Bulk Exports Details—Columbia River Washington (1,000 Metric Tons)

Year	Minerals	Ores	Chemicals and Fertilizers	Petroleum Byproducts	Other	Total
Actual						
2002		0	112	767	108	986
2003		0	427	811	131	1,369
2004		33	510	745	222	1,510
2005		242	560	703	65	1,570
2006		289	454	704	73	1,520
2007		411	608	610	81	1,711
Forecast						
2010		439	653	810	94	1,996
2015		459	715	845	94	2,113
2020		480	774	867	94	2,215
2025		486	829	878	94	2,287
2030		483	882	881	94	2,339
Average Annual Growth Rates						
2002-2007			40.4%	-4.5%	-5.5%	11.7%
2007-2010		12.6%	3.1%	2.9%	7.5%	4.9%
2010-2015		0.9%	1.8%	0.9%	0.0%	1.1%
2015-2020		0.9%	1.6%	0.5%	0.0%	0.9%
2020-2025		0.3%	1.4%	0.3%	0.0%	0.6%
2025-2030		-0.1%	1.2%	0.1%	0.0%	0.5%
2007-2030		0.7%	1.6%	1.6%	0.6%	1.4%

Source: BST Associates, IHS Global Insight

Table 2-29: Dry Bulk Imports Details—Columbia River Oregon (1,000 Metric Tons)

Year	Minerals	Ores	Chemicals and Fertilizers	Non Met Min Manuf	Other	Total
Actual						
1997	2,398	0	602	0	4	3,004
1998	1,934	0	1,415	0	0	3,349
1999	1,761	0	1,563	0	0	3,324
2000	2,058	0	1,767	0	0	3,825
2001	1,788	0	1,452	0	0	3,240
2002	2,161	0	1,219	0	0	3,380
Forecast						
2005	2,260	0	1,204	0	0	3,464
2010	2,364	0	1,179	0	0	3,543
2015	2,531	0	1,247	0	0	3,778
2020	2,710	0	1,318	0	0	4,028
2025	2,872	0	1,408	0	0	4,280
Average Annual Growth Rates						
1997-2002	-2.10%	NM	15.10%	NM	-100.00%	2.40%
2000-2005	1.90%	NM	-7.40%	NM	NM	-2.00%
2005-2010	0.90%	NM	-0.40%	NM	NM	0.50%
2010-2015	1.40%	NM	1.10%	NM	NM	1.30%
2015-2020	1.40%	NM	1.10%	NM	NM	1.30%
2020-2025	1.20%	NM	1.30%	NM	NM	1.20%
2002-2025	1.20%	NM	0.60%	NM	NM	1.00%

Source: BST Associates, IHS Global Insight

Table 2-30: Dry Bulk Exports Details—Columbia River Oregon (1,000 Metric Tons)

Year	Minerals	Ores	Chemicals and Fertilizers	Petroleum Byproducts	Other	Total
Actual						
2002		0	3,568	143	72	3,783
2003		34	3,565	0	33	3,632
2004		0	3,752	0	13	3,765
2005		32	3,904	2	4	3,941
2006		10	3,464	36	5	3,515
2007		24	4,643	30	7	4,704
Forecast						
2010		27	4,987	24	7	5,046
2015		28	5,458	26	7	5,520
2020		29	5,913	27	7	5,976
2025		30	6,333	27	7	6,397
2030		30	6,736	27	7	6,800
Average Annual Growth Rates						
2002-2007			5.4%	-27.0%	-36.5%	4.5%
2007-2010		-3.1%	5.0%	67.8%	15.5%	5.1%
2010-2015		0.6%	1.8%	1.6%	0.0%	1.8%
2015-2020		1.0%	1.6%	0.3%	0.0%	1.6%
2020-2025		0.3%	1.4%	0.2%	0.0%	1.4%
2025-2030		-0.1%	1.2%	0.0%	0.0%	1.2%
2007-2030		1.0%	1.6%	-0.4%	0.0%	1.6%

Source: BST Associates, IHS Global Insight

Liquid Bulks

The liquid bulk trades in the Pacific Northwest are dominated by petroleum, including crude oil and refined products. A variety of other liquid commodities are also handled, but in much smaller volumes.

In Puget Sound, imports of crude oil to the refineries at Cherry Point and March Point make up the lion's share of liquid bulk movements moving into and out of the area. In addition to crude oil, refined products are both shipped and received by Puget Sound ports in large volumes. Most of the remaining liquid bulk tonnage is comprised of chemicals and animal fats, which move in significantly smaller volumes than petroleum products.

Petroleum products also dominate the liquid bulk trade on the Columbia River, although not to the extent it does on Puget Sound. There are no oil refineries on the Columbia River, which limits the amount of crude oil imported into river ports. However, asphalt production in the region does use crude oil that is imported by water. Shipment and receipt of petroleum products are also important for this region, and movements of chemicals and fertilizers play a larger role in the Lower Columbia River than in Puget Sound. For example, in Kalama toluene is received for chemical processing, while Vancouver receives liquid fertilizers for agriculture. Vancouver also receives chemicals for forest products firms and for local chemical producers.

Overall Trends and Forecasts

Five refineries on Puget Sound receive oil for processing: two at Cherry Point near Ferndale, two at March Point near Anacortes, and one smaller facility in Tacoma. Currently, most of the crude oil used at Puget Sound refineries originates in Alaska, and the majority of this is shipped by tanker via the Trans-Alaska Pipeline terminal in Valdez, Alaska. In addition, a small but growing amount of foreign crude is imported by tanker and by pipeline.

Imports of foreign refined petroleum products are also expected to increase as the growth in demand outstrips the capacity of Puget Sound refineries. Puget Sound refineries are eking out incremental capacity increases but this is insufficient to meet expected demand for products. Imports from overseas and from Canada are expected to make up the difference.

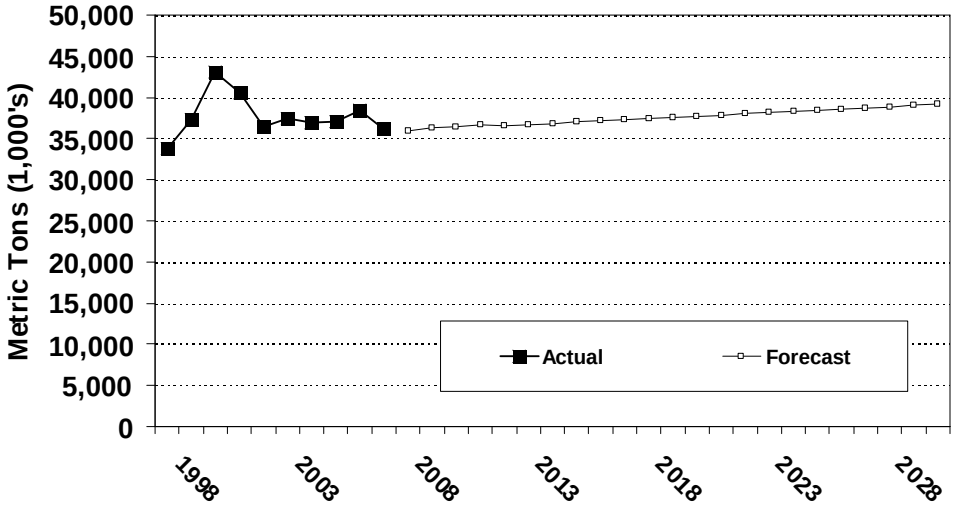
Most of the refined product shipped from the refineries moves by pipeline, but a significant share is also shipped via barge and tanker to points on Puget Sound, the Columbia River, and other domestic destinations. Furthermore, one of the major pipeline terminals is in Vancouver, Washington, at the Tidewater barge facility. This terminal is used to load barges with refined petroleum products for shipment upriver to Pasco.

In addition to the crude oil and refined petroleum products, various other liquid bulks are shipped by water to and from Washington ports, including chemicals and animal oils and fats.

Puget Sound

Shipments and receipts of refined products have been growing at the same time that domestic receipts of crude have been dropping. From 2002 through 2007 imports of refined petroleum products increased by an average of 1.3 percent per year while exports increased by 7.6 percent per year. The import growth rate is projected to fall to 1.3 percent for the entire forecast period, while the export growth rate is projected to fall to 0.1 percent. See Figure 2-17.)

Figure 2-17: Puget Sound Liquid Bulk Forecast
(1,000 Metric Tons)



Source: BST Associates, IHS Global Insight

From 2002 through 2007 waterborne imports of foreign crude oil jumped from 2.6 million tons to 5.2 million tons, or an average growth rate of 14.7 percent. This rate is not sustainable, but growth should remain strong throughout most of the forecast period. Overall, imports of crude oil are forecast to climb by an average of 4.4 percent per year from 2007 through 2030. As explained further below, crude oil is also imported by pipeline from Canada.

Exports of animal fats and oils and chemicals are very small in comparison with petroleum. (See Table 2-31.)

Table 2-31: Liquid Bulk Trends and Forecast—Puget Sound (1,000 Metric Tons)

Year	Imports	Exports	Domestic Receipts	Domestic Shipments	Total
Actual					
2002	3,040	1,183	23,377	6,437	34,037
2003	4,470	1,357	23,066	6,273	35,167
2004	4,067	1,713	22,070	7,186	35,036
2005	4,722	647	21,358	7,266	33,993
2006	6,211	1,430	19,266	8,494	35,401
2007	5,544	1,518	18,904	7,824	33,789
Forecast					0
2010	6,626	1,829	17,993	7,731	34,178
2015	9,943	2,208	15,106	7,824	35,080
2020	7,125	2,671	18,379	7,937	36,112
2025	11,636	2,727	14,326	8,051	36,739
2030	17,754	2,780	8,677	8,170	37,380
Average Annual Growth Rates					
2002-2007	12.8%	5.1%	-4.2%	4.0%	-0.1%
2007-2010	7.0%	23.1%	-3.4%	1.2%	0.1%
2010-2015	8.5%	3.8%	-3.4%	0.2%	0.5%
2015-2020	-6.4%	3.9%	4.0%	0.3%	0.6%
2020-2025	10.3%	0.4%	-4.9%	0.3%	0.3%
2025-2030	8.8%	0.4%	-9.5%	0.3%	0.3%

Source: BST Associates, IHS Global Insight

Crude Oil

Waterborne receipts of crude oil on Puget Sound are primarily used for feedstock at the five petroleum refineries. The majority of this crude oil currently comes from Alaska, but as production in Alaska declines an increasing share will be imported from foreign sources.

According to the most recent estimates from the U.S. Department of Energy, the long-term estimate shows Alaskan crude oil production dropping to 300,000 barrels per day in 2030, which is about 41 percent of the current production level. As shown in the Table 2-32, this level is substantially less than the total current capacity at Puget Sound refineries. Furthermore, Alaskan crude is shipped to California as well as to Puget Sound.

Table 2-32: Puget Sound Refinery Capacity (barrels per day)

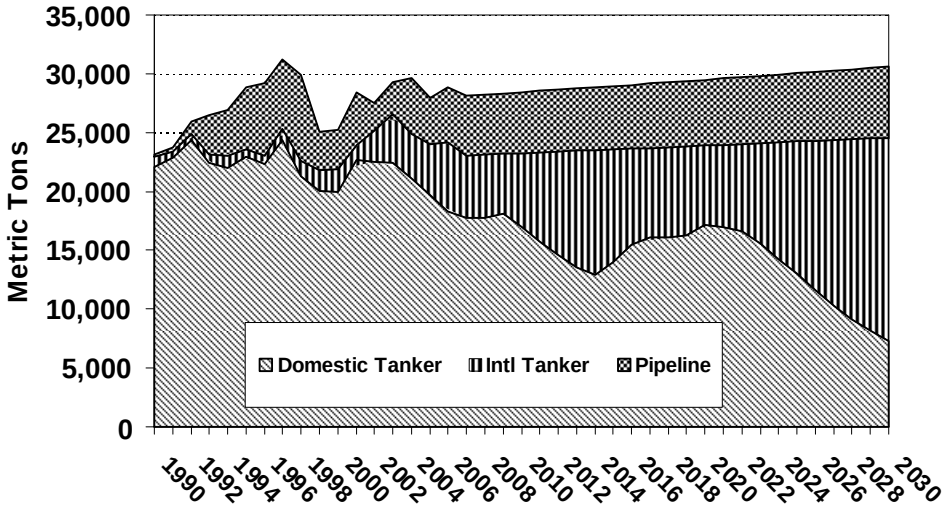
Area	1994	2000	2008	Annual Change 94-00	00-08	94-08
Ferndale (Cherry Point)	263,300	311,220	334,000	2.8%	0.9%	1.7%
Anacortes (March Point)	228,600	249,500	265,000	1.5%	0.8%	1.1%
Tacoma	44,300	40,000	37,850	-1.7%	-0.7%	-1.1%
Total	536,200	600,720	636,850	1.9%	0.7%	1.2%

Source: Washington State Department of Ecology

An increasing share of crude oil will have to come from international sources, with the most likely being the Middle East, Southeast Asia, Papua New Guinea, South America, and Russia.

Crude oil receipts (from both domestic and foreign sources) are projected to climb slowly over the life of the forecast, from 28.1 million tons in 2007 to 30.6 million tons in 2030 or at 0.4 percent per year. Domestic receipts from Alaska are expected to decline from 17.8 million tons in 2007 to 13.1 million tons in 2030. (See Figure 2-18.)

Figure 2-18: Crude Oil Forecast (1,000 Metric Tons)



Source: BST Associates, IHS Global Insight

By the year 2013 the volume of crude oil imported from foreign sources is expected to exceed that arriving from domestic sources. In 2007 domestic oil accounted for 95 percent of waterborne receipts and foreign accounted for 4 percent, but by the end of the forecast period (2030) the domestic share is projected to drop to 24 percent and the foreign share climb to 76 percent.

Refined Petroleum Products

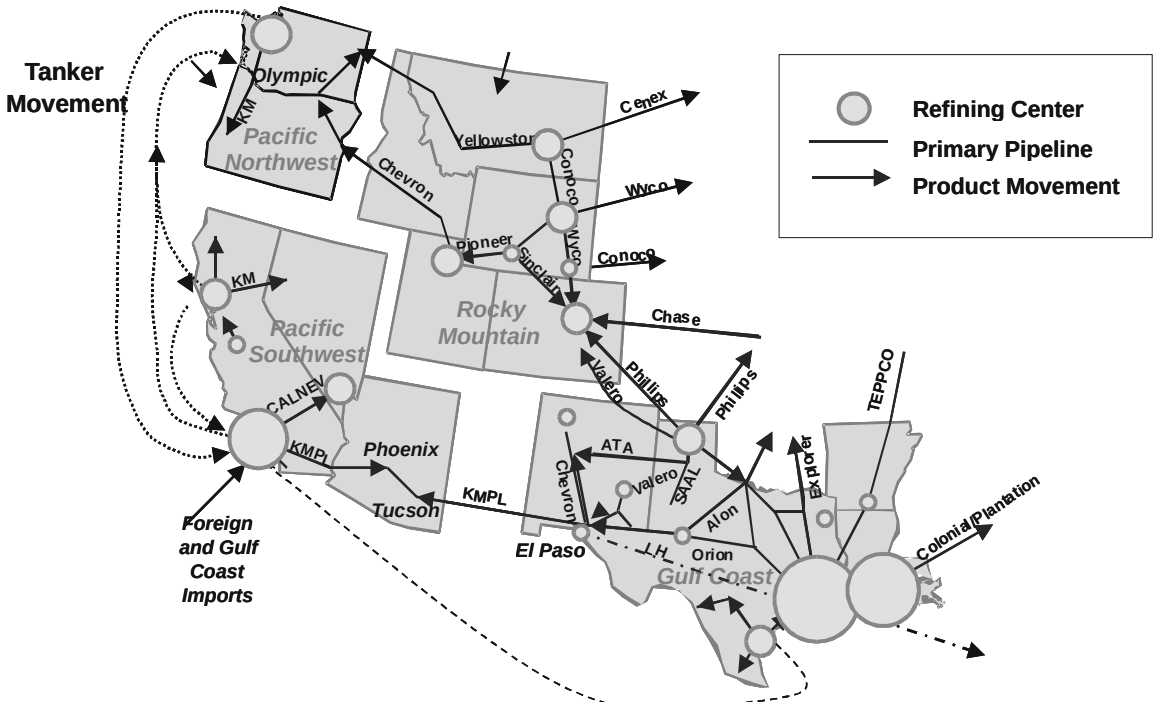
In addition to the increase in foreign crude oil, it is likely that imports of foreign refined petroleum products will also increase. The tankers that call in Puget Sound are limited by law to a smaller size than that commonly used in international trade. As domestic receipts of Alaskan crude oil begin to taper off, the refinery operators will face the choice of moving foreign crude long distances in inefficiently sized vessels, or importing refined products to the refineries and other storage facilities.

Growth in refining capacity is also expected to slow, and once refineries reach maximum production the only way to increase capacity will be a substantial investment in capital. This forecast assumes that as crude oil receipts level off, imports of refined product will continue to grow in order to meet the demand that the refineries cannot meet.

Four pipelines carry refined petroleum products in Oregon and Washington: the Olympic Pipeline, Chevron Pipeline, Yellowstone Pipeline, and Kinder Morgan Pipeline. Of these, the Olympic Pipeline is the most important. This line runs from the refineries on Puget Sound as far south as Portland, and has distribution terminals located at Bayview (Mount Vernon), Seattle, Renton, Sea-Tac, Tacoma, Spanaway, Olympia, and Vancouver in Washington, as well as Linnton and Portland in Oregon. The throughput capacity for this line is approximately 4.6 billion gallons per year, and it carries gasoline, diesel fuel and jet fuel. This pipeline carries a relatively large share of the refined products shipped to the Portland area.

The Chevron Pipeline runs between Salt Lake City and Pasco, with an extension connecting Pasco with Spokane. The Yellowstone Pipeline runs from Billings, Montana to Spokane and Moses Lake, Washington. The Kinder Morgan Pipeline runs from Portland to Eugene, and supplies virtually all of the gasoline used in the Willamette Valley. (See Figure 2-19.)

Figure 2-19: Western Region Refined Product Supply-Demand Network



Source: EAI, Inc

Lower Columbia

Liquid bulk traffic on the Lower Columbia River primarily includes refined petroleum products and chemicals. The Lower Columbia River region has no oil refineries, so all of the gasoline, diesel fuel, jet fuel, heating oil and other refined petroleum products must be shipped to the area. Most of petroleum products used in this region, as well as in most of Oregon, originate at refineries on Puget

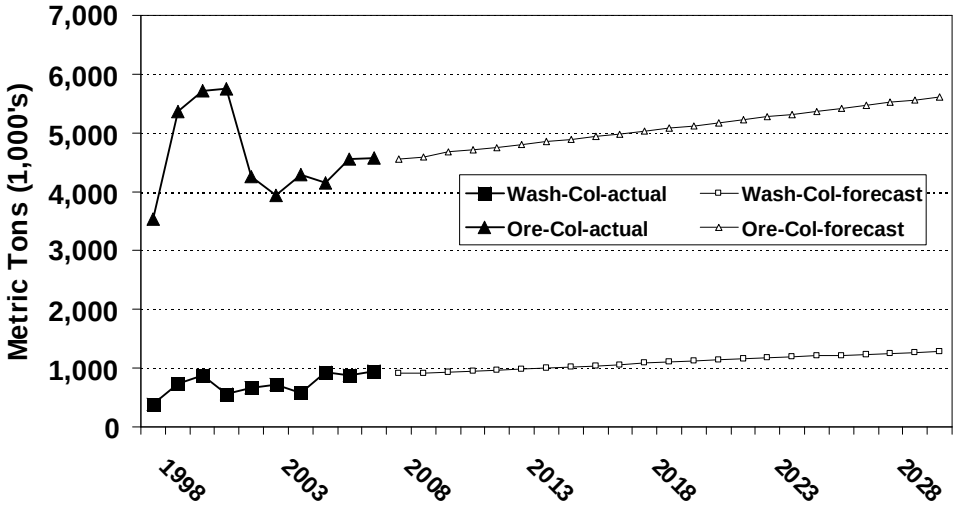
Sound. They are shipped to the region primarily by pipeline or by water. In addition, some petroleum products are shipped to the area by water from California.

The Columbia River experienced a large increase in waterborne receipts in 2000 and 2001 as a result of closure of the Olympic Pipeline. However, the pipeline has reopened and waterborne shipments have returned to pre-closure volumes.

The two main types of chemicals received on the Columbia River are nitrogenous fertilizers and benzene/toluene. Nitrogenous fertilizers declined substantially during the 1990's and this decline is expected to continue due to an increase in domestic production of these products near the Tri-Cities. Benzene and toluene, which are inputs to chemical manufacturing processes, have remained relatively stable. Other receipts have included alcohols, ammonia and other hydrocarbons, but these receipts are quite limited in volume.

The forecast for receipts of refined petroleum products assumes that the overall market for refined products in the Lower Columbia region (and its hinterland) grows at between 1.0 percent to 1.7 percent per year for the period 2000 to 2010, then declines to 0.5 percent to 1.1 percent per year for the next decade and remains constant at this level until 2030. (See Figure 2-20.)

Figure 2-20: Columbia River Liquid Bulk Forecast
(1,000 Metric Tons)



Source: BST Associates, IHS Global Insight

Crude oil receipts are expected to increase in line with construction activity in the Lower Columbia River region, at around 1.5 percent per year.

Receipts of liquid chemical and fertilizer products are expected to increase at average annual rates of between 0.2 percent and 0.8 percent during the course of the study period. Coastwise shipments are expected to remain at low volumes throughout the study period. (See Tables 2-33 through 2-37.)

Table 2-33: Liquid Bulk Trends and Forecast—Columbia River Washington (1,000 Metric Tons)

Year	Imports	Exports	Domestic Receipts	Domestic Shipments	Total
Actual					
2002	281	0	211	182	675
2003	304	0	188	234	726
2004	243	0	116	212	572
2005	384	0	233	314	931
2006	414	0	151	315	879
2007	487	0	141	316	945
Forecast					0
2010	464	0	146	330	940
2015	534	0	147	341	1,022
2020	610	0	147	364	1,121
2025	676	0	147	384	1,207
2030	733	0	147	402	1,282
Average Annual Growth Rates					
2002-2007	11.6%		-7.8%	11.7%	7.0%
2007-2010	3.9%		-9.0%	1.0%	0.2%
2010-2015	2.8%		0.2%	0.6%	1.7%
2015-2020	2.7%		0.0%	1.3%	1.9%
2020-2025	2.1%		0.0%	1.1%	1.5%
2025-2030	1.6%		0.0%	0.9%	1.2%
2007-2030	1.5%		0.1%	0.9%	1.1%

Source: BST Associates, IHS Global Insight

Table 2-34: Liquid Bulk Trends and Forecast—Columbia River Oregon (1,000 Metric Tons)

Year	Imports	Exports	Domestic Receipts	Domestic Shipments	Total
Actual					
2002	966	0	3,234	2,089	6,290
2003	1,095	0	2,716	2,207	6,018
2004	900	0	3,332	1,849	6,081
2005	725	0	3,391	1,729	5,845
2006	821	0	3,704	1,825	6,350
2007	1,122	0	3,430	1,874	6,426
Forecast					0
2010	1,227	0	3,449	1,933	6,609
2015	1,456	0	3,435	1,996	6,887
2020	1,695	0	3,429	2,127	7,251
2025	1,938	0	3,429	2,237	7,604
2030	2,190	0	3,428	2,337	7,955
Average Annual Growth Rates					
2002-2007	3.0%		1.2%	-2.2%	0.4%
2007-2010	11.1%		0.3%	2.3%	2.5%
2010-2015	3.5%		-0.1%	0.6%	0.8%
2015-2020	3.1%		0.0%	1.3%	1.0%
2020-2025	2.7%		0.0%	1.0%	1.0%
2025-2030	2.5%		0.0%	0.9%	0.9%
2007-2030	2.4%		0.0%	0.8%	0.8%

Source: BST Associates, IHS Global Insight

Table 2-35: Liquid Bulk Imports Details—Puget Sound (1,000 Metric Tons)

Year	Crude Petroleum	Liquid Petroleum Products	Other	Total
Actual				
2002	2,631	259	151	3,040
2003	4,168	171	132	4,470
2004	3,746	181	141	4,067
2005	4,332	323	67	4,722
2006	5,893	297	21	6,211
2007	5,224	276	44	5,544
Forecast				
2010	6,305	272	48	6,626
2015	9,584	296	62	9,943
2020	6,716	330	79	7,125
2025	11,176	362	98	11,636
2030	17,238	396	119	17,754
Average Annual Growth Rates				
2002-2007	14.7%	1.3%	-21.8%	12.8%
2007-2010	7.8%	-3.3%	-6.4%	7.0%
2010-2015	8.7%	1.7%	5.3%	8.5%
2015-2020	-6.9%	2.2%	4.9%	-6.4%
2020-2025	10.7%	1.9%	4.4%	10.3%
2025-2030	9.1%	1.8%	4.0%	8.8%
2007-2030	4.4%	1.3%	3.6%	4.2%

Source: BST Associates, IHS Global Insight

Table 2-36: Liquid Bulk Exports Details—Puget Sound (1,000 Metric Tons)

Year	Petroleum Products	Animal and Vegetable Oil	Chemicals and Other	Total
Actual				
2002	2,631	259	151	3,040
2003	4,168	171	132	4,470
2004	3,746	181	141	4,067
2005	4,332	323	67	4,722
2006	5,893	297	21	6,211
2007	5,224	276	44	5,544
Forecast				
2010	6,305	272	48	6,626
2015	9,584	296	62	9,943
2020	6,716	330	79	7,125
2025	11,176	362	98	11,636
2030	17,238	396	119	17,754
Average Annual Growth Rates				
2002-2007	14.7%	1.3%	-21.8%	12.8%
2007-2010	7.8%	-3.3%	-6.4%	7.0%
2010-2015	8.7%	1.7%	5.3%	8.5%
2015-2020	-6.9%	2.2%	4.9%	-6.4%
2020-2025	10.7%	1.9%	4.4%	10.3%
2025-2030	9.1%	1.8%	4.0%	8.8%
2007-2030	4.4%	1.3%	3.6%	4.2%

Source: BST Associates, IHS Global Insight

Table 2-37: Liquid Bulk Details—Columbia River Washington (1,000 Metric Tons)

Year	Petroleum Products	Chemicals	Total
Actual			
2002	1,078	291	1,369
2003	1,262	263	1,525
2004	1,609	110	1,719
2005	1,426	54	1,480
2006	1,725	44	1,770
2007	1,554	54	1,609
Forecast			
2010	1,580	63	1,643
2015	1,591	72	1,663
2020	1,590	82	1,672
2025	1,590	92	1,682
2030	1,590	102	1,692
Average Annual Growth Rates			
2002-2007	7.6%	-28.5%	3.3%
2007-2010	2.1%	3.3%	2.1%
2010-2015	0.1%	2.8%	0.2%
2015-2020	0.0%	2.7%	0.1%
2020-2025	0.0%	2.3%	0.1%
2025-2030	0.0%	2.0%	0.1%
2007-2030	0.1%	2.3%	0.2%

Source: BST Associates, IHS Global Insight

Other Liquid Bulk Cargoes

In addition to crude oil, petroleum products, and chemicals, there are other liquid bulk cargoes that are beginning to flow through Washington State ports. Most notably, there has been an increase in production of biodiesel, methane and other liquid bulk products.

There are currently seven biodiesel production facilities in Washington State, with a combined capacity of 135 million gallons per year (MGY). Over the last year, a number of other biodiesel projects have been put on-hold or have been cancelled, with high feedstock costs cited as the major concern. The largest of the existing facilities is Imperium Grays Harbor (IGH), which opened in August 2007. It is the nation's largest biodiesel plant with a 100 million gallon per year nameplate capacity. IGH is capable of producing pure, unblended B100 biodiesel refined from a variety of products (oils, canola, soy, and other crops grown in Washington State, Canada, and elsewhere). Some of the inputs to the production process could come from overseas by water. In addition, a portion of the outputs of production could also be transported by water to Hawaii, California, Asia, Europe and other locations.

Existing economic conditions (particularly declining consumption patterns, a downturn in petroleum product prices, and proposed tariffs by the European Union and other countries) will likely reduce product flows in the short term. IGH could increase liquid bulk traffic at Washington State ports by approximately nine percent, if all output were to be shipped by water. Because the details and timing of production are uncertain, the potential waterborne volumes associated with biodiesel and other liquid bulk cargoes are not included in the forecast.

Assessment of Competitive Gateways

Washington State ports face substantial competition from other ports and shipping routes. As discussed above, discretionary cargo (i.e., containers, autos, grain, dry bulks and breakbulk cargoes) can shift to other gateways if shipping through these other ports becomes more efficient or cost effective than using ports in Washington State. The following section evaluates the gateways that compete with Washington's ports for container imports from Asia.

Southern California

The ports of Los Angeles and Long Beach are located in the largest domestic market on the West Coast. As a result, the San Pedro Bay ports naturally attract a tremendous volume of import containers for consumption in the local and regional market, as well as huge volumes destined for distribution throughout the eastern two-thirds of North America. The result has been the construction of large numbers of distribution centers in Southern California where import containers are processed and transloaded for shipment east. Containers handled by the Pacific Southwest ports involve a much higher mix of local distribution commodities combined with discretionary products than do other West Coast ports.

Similarly, with such a tremendous advantage in its domestic consumer base, Southern California naturally attracts a significant westbound flow of intermodal traffic, including international containers loaded with domestic products that are off-loaded at Southern California distribution centers. The containers are then either returned empty to one of the two ports, or they are loaded with products for export.

Future growth at the Southern California ports will be impacted by several important issues. Extensive efforts to reduce pollution in the Los Angeles Basin include both the ports and the truck and rail operations that support the ports. Both of the ports have proposed the implementation of the Infrastructure Cargo Fee of $15 per Twenty-Foot Equivalent Unit (TEU), or $30 per Forty Foot Equivalent Unit (FEU). This fee is designed to generate $1.4 billion for rail and road infrastructure improvements to improve the flow of traffic through the ports. However, the Port of Long Beach recently announced plans to delay implementation of the fee for at least six months, and the Port of Los Angeles is expected to follow suit.

In addition, both ports had planned to implement a separate fee ($35 per TEU) to fund a program to replace 16,000 trucks used in harbor service that are non–compliant with emission standards. The program is designed to generate $1.6 billion over five years to fund a truck-replacement subsidy program. The Federal Maritime Commission filed suit to stop the implementation of the program as a violation of federal law, and the issue is now in the process of a 45-day waiting period and may not be resolved until early in 2009.

The combination of these two fees would increase the cost of moving containers through Southern California by $50 per TEU. From a competitive standpoint, that charge would not seem to be severe in light of the huge regional market Southern California presents. It could, however, cause some shift of discretionary cargo to other ports. (Note: discretionary cargo is generally defined as containers shipped by rail from the West Coast to points east of the Rocky Mountains).

Both of the major western railroads that serve Southern California (BNSF and UP) have plans for facility expansions in the Los Angeles Basin that have met resistance from a variety of sources, similar to the resistance that port expansion plans have faced. BNSF has plans to construct a new international container intermodal facility near the ports. However, it has run into considerable opposition from local communities, due to potential environmental impacts. Similarly, UP has plans to expand its International Container Facility near the ports, but has also met significant opposition from local communities.

Both railways have been pursuing capacity improvement initiatives farther inland that are designed to increase rail capacity between the Los Angeles Basin and the Midwest, Southeast, and Eastern U.S. A major project supported by both railroads is the construction of a rail grade separation (known as a flyover) at the Colton Crossing interlocking, approximately 70 miles east of the ports. One of the busiest rail crossings in the U.S., Colton Crossing is the location where the two main rail routes serving Southern California cross at-grade.

In addition, BNSF recently completed construction of a third main track over Cajon Pass, between San Bernardino and Barstow on the Transcontinental Mainline (Transcon). Most of BNSF's traffic and a share of UP's traffic into and out of the Los Angeles basin crosses Cajon Pass. Combined with UP's parallel main track, there are now four mainline tracks across Cajon Pass. Only UP operates on its own main track, while BNSF and UP trains jointly operate over the three BNSF mainlines.

Further inland, both railroads have aggressive programs in place to increase capacity on their mainline corridors that serve Southern California.

BNSF has had a multi-year program in place to double-track the Transcon between Barstow and Chicago, particularly between Barstow and Avard, Oklahoma. Most single-track segments have now been double-tracked. Construction on the most difficult area, through the Abo Canyon in New

Mexico, has recently, with completion of 4.5 miles of double-track expected by mid-year 2011. Once completed, BNSF will be essentially double-tracked between Barstow and Avard, Oklahoma. Some segments of single track remain east of Avard towards Chicago, primarily in Kansas, but BNSF has a long-term plan to double-track those segments as capacity demand requires.

Another capacity enhancement BNSF has recently implemented between Southern California and the Midwest is the operation of 10,000-foot intermodal trains. Operation of trains of that size was long thought to be counter-productive, but after a period of test operations BNSF has expanded the number of weekly 10,000 foot trains.

Similar to BNSF, UP has also had an intensive program of capacity expansion on its primary mainline between the Los Angeles Basin and El Paso, known as the Sunset Route. The UP program has focused on constructing double track at the rate of 50 to 70 miles a year and with the goal of having the entire route double-tracked in the next few years. Additionally, UP is planning to construct a new intermodal and fueling facility west of El Paso. This would reduce congestion for trains destined for Chicago via Kansas City or Houston/New Orleans via San Antonio.

Northern California

The closure of military bases adjacent to the Port of Oakland in recent years made large parcels of waterside property available for redevelopment, and the Port of Oakland has aggressively pursued expansion of its marine terminals and near-dock intermodal facilities.

Intermodal traffic at the Port of Oakland is constrained in several places, including congestion between Oakland and Richmond at the Martinez subdivision, and constraints in the mountain passes (Tehachapi and Donner passes). The Port of Oakland has been working with the UP and BNSF railroads to obtain State Infrastructure Bond (I-Bond) funds for line improvements over Donner Pass, Tehachapi Pass, and the Martinez Subdivision. In addition, the port has sought I-Bond funds for improvement projects within the port. However, due to the severe budget problems in California this funding source is currently on hold.

A major issue remaining to be resolved is the cost, benefits, and cost-split for increasing capacity on the Martinez Subdivision. The Martinez Sub is Union Pacific's principal gateway to the San Francisco Bay Area from the east, hosting both transcontinental traffic via the former Overland Route and southbound traffic from the Pacific Northwest. In addition to freight traffic the route also carries an increasing number of commuter trains, as well as Amtrak traffic. According to the railroads the segment is now operating above optimum capacity. Planned improvements to the Martinez Subdivision are estimated to cost $1 billion, which is larger than can reasonably be expected to be matched by the state with I-Bond funds. Therefore, the port and railroads are evaluating combinations of projects that would maximize the increase of capacity with less funding.

One potential solution includes the reopening by the UP of the "Mococo Line" between Pittsburg and Tracy. The Mococo Line has seen little use in recent years other than for railcar storage, but has never been officially abandoned. Reopening this branch line for mainline operations is being driven by plans to take the Benicia Bridge out of service during upgrades to the Martinez Subdivision. However, the communities through which the Mococo Line runs are strongly opposed to its upgrade from a branch line with essentially no traffic, to a high density mainline route, for the duration of the Martinez Bridge outage.

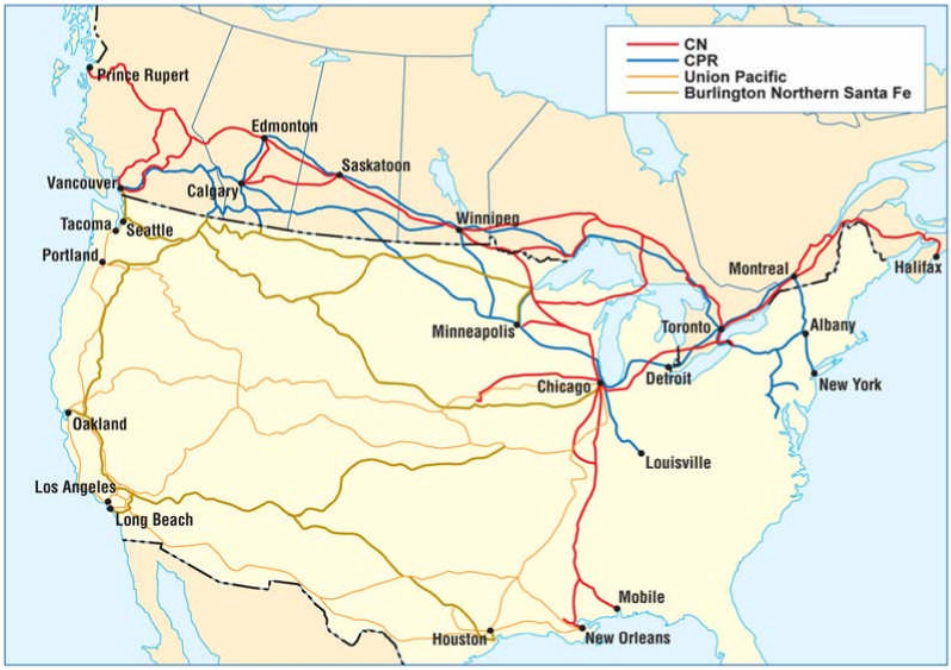
British Columbia

The major ports in British Columbia handle many of the same cargoes as Washington's ports, and are viewed as a competitive threat. The following section presents information on recent and planned rail improvements that could impact the competitive positions of the Canadian ports.

Two ports in British Columbia represent competition to Washington's ports, namely Port Metro Vancouver (PMV) and the Port of Prince Rupert (PPR). Both Canadian ports handle the full range of commodities handled by Washington ports, including international containers, grain and other agricultural products, forest products, finished autos and auto parts, and other general import/export merchandise. In addition, both ports are key export facilities for other Canadian bulk products such as coal, sulphur, and potash.

Both of the British Columbia ports actively market their facilities as alternatives to U.S. West Coast ports for international container traffic destined for the Midwest and Eastern U.S. Rail service plays a vital role in the success of the Canadian ports, and both have taken active roles in improving rail service. The federal, provincial, and local governments have strongly supported the efforts of the ports, and all of the railroads that provide service to the ports have been actively in improving capacity. These operational and infrastructure improvements provide benefits to all of the parties involved. Figure 2-21 illustrates the location of the British Columbia ports and the rail system.

Figure 2-21: Canadian Rail System and BC Port Locations



Source: BC Ministry of Transportation

Port Metro Vancouver (BC)

PMV was formed in early 2008 through the merger of the three main ports in the Vancouver, BC area (i.e., Vancouver Port Authority, the Fraser River Port Authority, and the North Fraser Port Authority). The consolidated port handles all of the commodities described above, and offers services for all handling groups, including international container, bulk, breakbulk, roll-on/roll-off,

and domestic barge operations. By tonnage the PMV is the largest port in Canada as well as one of the largest on the West Coast of North America.

Prior to the early 1990s, all of Vancouver's international container operations occurred on the South Shore of Burrard Inlet, near downtown Vancouver, and volumes were relatively limited. In the early 1990s the Deltaport container terminal was constructed at Roberts Bank, located south of Vancouver and across the U.S.-Canadian border from Point Roberts, Washington. Until that time Roberts Bank was primarily used for exporting coal, through the Westshore Terminal.

Roberts Bank Facility

In order to build the port facilities at Roberts Bank, a man-made island, or "pod", was created offshore, adjacent to the community of Delta. The pod is connected to shore via a man-made causeway that carries both road and rail traffic, and includes a support yard for both intermodal and coal rail traffic. Both major Canadian railways—Canadian National (CN) and Canadian Pacific (CP)—were active participants in creating the Roberts Bank facility, constructing a mainline rail connection from Roberts Bank to the "joint rail corridor" at Colebrook and the CN mainline. Roberts Bank includes both Westshore Terminal, which is the coal export terminal, and Deltaport, which is the container facility.

Roberts Bank has been a key to Port Metro Vancouver's long-term strategy to develop its import/export capacity. Deltaport has grown from a small international container operation at its inception to handling approximately one million TEUs in 2008. Similarly, coal exports through Westshore Terminal, have grown to more than 20 million tons annually.. These increases have not been at the expense of other terminals in the Greater Vancouver area but have come through growth in overall volumes. The PMV has a long-term plan to be a leading port on the West Coast of North America, including a rapidly growing position in containers and a key position in export bulk commodities. Indeed, while international container traffic through other West Coast ports declined in the first three quarters of 2008, PMV container volumes increased approximately 3 percent.

In addition to Deltaport, the older downtown container terminals, Centerm and Vanterm, have handled increasing volumes of international containers. Recent improvements to both infrastructure and operations have provided for growth at these terminals, and planning is now underway for expansion at both facilities that will significantly improve capacity. (See Figure 2-22.)

Figure 2-22: Port Metro Vancouver (BC)

Source: BC Ministry of Transportation

Due to the success of Deltaport, a third berth is under construction which, in conjunction with other operational changes being implemented, will significantly increase Deltaport's international container throughput. To support the increased throughput, the port, it's terminal operator, and the railroads are designing improvements to the rail infrastructure on the Causeway and at the adjacent Gulf Yard that will provide the necessary rail capacity.

Finally, as a result of the success of its international container program, PMV is actively pursuing an expansion of the "pod" at Roberts Bank to construct a second international container facility, Terminal 2. The new terminal would match or exceed, the current planned capability of Deltaport with Berth 3. A variety of environmental, community, and other issues have yet to be resolved in order to develop T-2, but PMV has a record of success with such projects.

Vancouver (BC) Area Rail Improvements

Anticipating the growth in port-related rail traffic in the Vancouver area, PMV has been working with governmental agencies, communities, and the railroads to improve the rail corridors that serve the port facilities. These rail corridor planning efforts are quite similar in scope and intent to the FAST I and II projects in Washington. Because of the positive impact that these rail system upgrades will have on port operations, the PMV has committed significant funding to the projects.

One of these corridor projects is intended to provide the rail capacity needed to handle the anticipated growth in intermodal traffic to or from Roberts Bank. Port Metro Vancouver has committed $50 million (Canadian) as its portion of a projected project cost of $360 million (Canadian) for grade separations along the Roberts Bank Rail Corridor. The corridor project includes the construction of nine grade separations along the 46-mile route, as well as the extension of three rail sidings to improve meet/pass capabilities.

PMV is also participating in two similar planning efforts in the Greater Vancouver area to identify rail and roadway infrastructure improvements that will support projected rail growth, while reducing the impact that current and future rail volumes have on the general public. One study is

focused on the South Shore area of Burrard Inlet—known as the South Shore Trade Area (SSTA)—and the other study is focused on the North Shore of Burrard Inlet—North Shore Trade Area (NSTA).

PMV is actively participating in a study to determine what will be the long-term plan for improvement of rail service over the New Westminster Rail Bridge (also known as the Fraser River Bridge). The bridge is an increasingly significant capacity pinch-point in the lower mainland rail network and will continue to become more of an obstacle for efficient rail service as projected growth occurs. In addition to hosting a significant volume of freight traffic daily, the bridge also is the route for Amtrak, VIA Rail, and Rocky Mountaineer passenger service in and out of downtown Vancouver.

Finally, in addition to rail capacity improvements, PMV is involved in the planning for construction of a new truck route between Roberts Bank and the Fraser River industrial area in the general vicinity of the New Westminster Bridge and Canada Highway 1. The route, called the South Fraser Perimeter Road, would involve grade separating road and rail conflicts and redesigning the rail infrastructure in certain locations to improve rail capacity and efficiency and minimize conflicts with the general public.

The coordination between the ports, the federal, provincial and local governments, and the railroads gives a strong competitive advantage to PMV. Through its "Pacific Gateway Initiative," the federal government is willing to spend as much as $1 billion (Canadian) to ensure that Canada's West Coast ports, particularly PMV, can offer the most efficient import/export services as possible. Planning underway for port terminals and related infrastructure may allow PMV to increase its international container throughput by a factor of four.

The railroads have been largely supportive of PMV efforts to improve rail efficiency in the Greater Vancouver service area. One indication of this willingness to work together to increase rail capacity is a co-production agreement between the CN and CP. Co-production is a general description of operating protocols designed to maximize joint rail operations over existing infrastructure. The current agreements between CN and CP include the following:

- Directional running in the Fraser River Canyon between Basque and Mission/Matsqui. Virtually all westbound CN and CP trains toward Vancouver use CN's main track between Basque and Matsqui. Virtually all eastbound trains use the CP route between Mission (across the Fraser River from Matsqui) and Basque. A rail bridge between Mission and Matsqui allows for traffic to freely flow between the two mainline routes.
- CN handles all trains for both railways to the North Shore of Burrard Inlet (coal, potash, sulphur, grain).
- CP handles all trains for the South Shore of Burrard Inlet (intermodal, grain) from Boston Bar.
- CP handles all trains destined for Roberts Bank (intermodal, coal).
- CP provides switch service to all South Shore industries (international container, grain, and general merchandise) for both railways.
- Local switching support at Roberts Bank is provided by a wholly owned subsidiary of the two railways.
- BNSF and CN reached agreement whereby CN took over dispatch responsibility on the "Joint Section" between Sapperton Junction, Willingdon Junction and the South Shore of Burrard Inlet via CN's Main Yard, BNSF's Glen Yard, and Heatley Diamond.

Prince Rupert

The focus of the Port of Prince Rupert (PPR) has long been export commodities such as coal, grain, and forest products. In the fall of 2007, however, an international container facility was opened with the express purpose of competing with other Pacific Northwest ports (Seattle, Tacoma, and Vancouver, BC) for traffic to or from Eastern Canada and the Central/Eastern U.S.

The current Prince Rupert container terminal is designed for throughput of up to 500,000 TEU. However, expansion plans have been developed that could ultimately increase throughput to two million TEU. In 2008, the first full year of operation, total volume was 182,000 TEU and the port handled 78 container vessels. Planning for the Phase 2 expansion project is 95 percent complete, and the resulting in terminal capacity will increase to of 1.5 million TEU.

Rail service to Prince Rupert by CN, which has the only rail line to the port. CN is advertising 54-hour service for priority containers between Prince Rupert and Chicago, which, if achievable and sustained, is competitive with any other service from West Coast ports to Chicago. There are issues, however, with PP's long-term success in growing its intermodal volumes. Because CN is the sole rail service provider, so ocean carriers are captive to CN's pricing strategies and ability to deliver offered service.

Another issue for Prince Rupert is that, in comparison with other West Coast ports, the very limited local population represents a minor domestic market for westbound containers. This may result in a growing imbalance between full import containers and full export containers, with a growing number of containers returning empty to Prince Rupert. While there are opportunities to fill westbound containers with export commodities, especially Canadian agricultural or forest products, there is a finite amount of tonnage available for such movements. The more container imports grow at Prince Rupert, the more difficult it will become to provide a reasonable balance between loaded import containers versus loaded export containers.

One method sometimes employed to balance westbound empty containers with eastbound loaded import containers is to triangulate westbound container flows. Under this strategy, westbound containers are loaded with any load available, often domestic, and routed indirectly back to the export port. The idea is to get the benefit of a loaded move for at least part of the westbound container movement. The problem with triangulation in the case of the PPR is that it is far from the major domestic markets in western North America, so once the container is emptied and is destined for Prince Rupert, it still has to be hauled a relatively significant distance empty to get to Prince Rupert.

An additional issue that sometimes comes into play with triangulation is not enough rail cars arriving at a port in a consistent manner to meet import demands. This can result in a railway having to operate a "bare-table" train of empty rail cars to a port to ensure sufficient rail cars are on hand to meet ship arrivals. The result on rail operating efficiencies from the effects of triangulation can involve higher costs and lower equipment utilization.

Another potential future issue for Prince Rupert is the capacity of the main rail line to the port. The largest exporter of potash in the world, Canpotex, recently announced a decision to greatly increase its export capacity through Canadian ports through a twofold strategy. The first is to increase its throughput capability at the Neptune Terminal on the North Shore of Burrard Inlet in Vancouver. The second is to construct a new potash export facility at Prince Rupert. While the new potash facility is not expected to create local conflict issues with container operations at PPR, the potash trains operating over CN's route between Edmonton/Prince George and Prince Rupert could

reach a length of 8,500 feet. As intermodal and bulk traffic grows on the route, opportunities for capacity conflicts will increase, which could have an impact on service capabilities over the route for all traffic.

As with Port Metro Vancouver, the Port of Prince Rupert has received consistent support from the federal government and the BC Ministry of Transportation to develop the port as a viable alternative to other ports on the West Coast of North America. From a rail perspective, however, the presence of only one railroad limits the ability to increase efficiency through co-production and competition.

The success of Prince Rupert as an international container port facility will rest in large part on the willingness of the CN to maintain rail offerings, service and price, that are at least as good, if not better than that available at other West Coast ports. In the long run, the lack of a domestic local market for westbound containers could have an impact on the economic of moving containers through Prince Rupert.

All-Water Services via the Panama and Suez Canals

U.S. West Coast container traffic is also facing strong competition from all-water services using the Panama and Suez Canals. The Suez route is preferred for cargo that originates in South Asia or Southeast Asia and is destined for the U.S. East Coast, because it offers shorter sailing times than the Panama Canal route. For cargo originating in Northeast Asia, routing via the Panama Canal route or via West Coast ports and the intermodal system is more efficient.

Northeast Asia is a much larger trading region for the U.S. than South and Southeast Asia: in 2007 Northeast Asia accounted for 10.7 million TEUs, versus 2.2 million TEUs for South and Southeast Asia. As a result, most of the all-water routes use the Panama Canal.

The Panama Canal is currently limited to ships with the following dimensions:

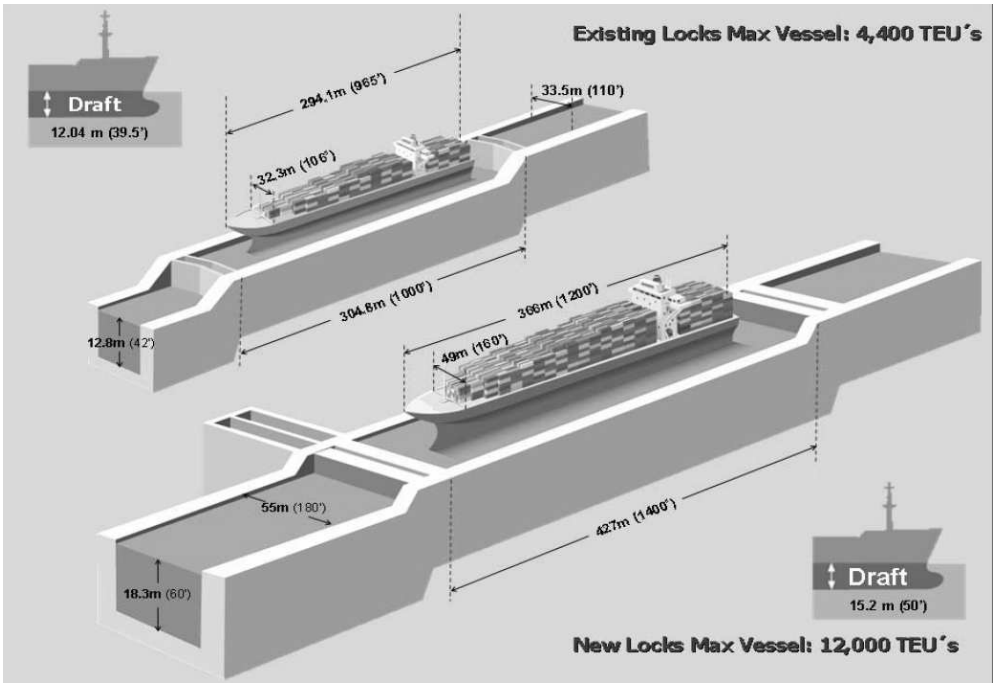
- Length: 294.1 meters (965 feet).
- Beam (width): 32.3 meters (106 feet).
- Draft: 12.0 meters (39.5 feet) in tropical fresh water.

Over the years, several types of vessels have seen dimensions that exceed the Panama Canal maximum ("Panamax"), including container ships, tankers, and dry bulk carriers. As a result, the Panama Canal Authority (ACP) has developed proposed expansion that includes the construction of a third traffic lane through the construction of two new sets of locks, one at each end of the Canal. Each of the new locks will have substantially larger dimensions:

- Length 427 meters (1,400 feet) long.
- Beam: 55 meters (180 feet) wide.
- Draft: 18.3 meters (60 feet) deep.

The new locks will ease congestion and allow larger ships to pass. The Panama Canal is currently limited to container vessels with a capacity of approximately 4,400 TEUs. After the expansion the Canal will be able to handle vessels up to 12,000 TEUs. Construction is currently underway, and initial plans call for the project to be completed by 2014 at a cost of around $5.3 billion. (See Figure 2-23.)

Figure 2-23: Planned Improvements to Panama Canal



Source: Panama Canal Authority

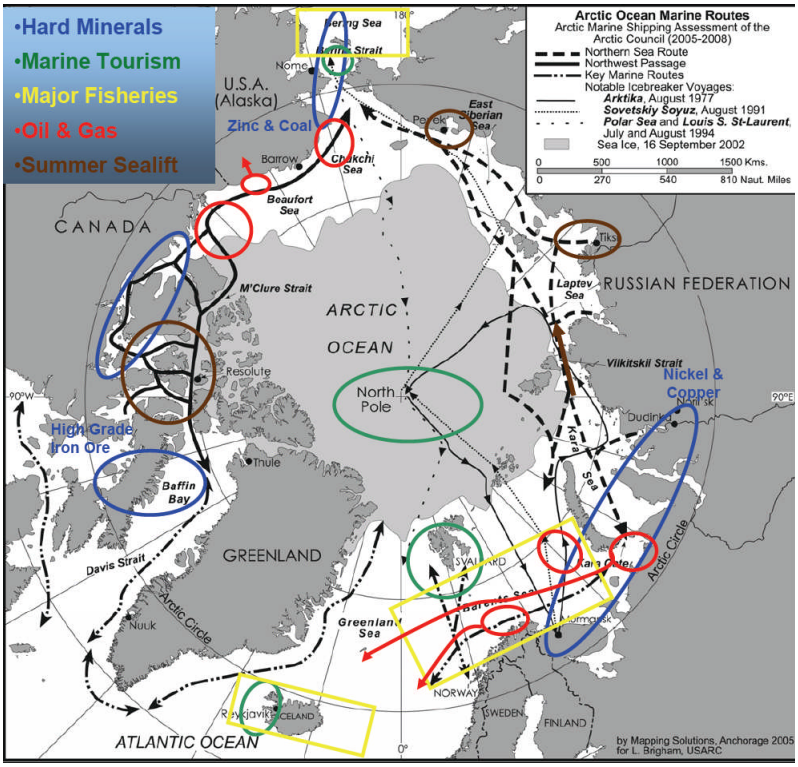
Improvements to the Panama Canal will likely allow vessels in the 6,000 to 8,000 TEU range to become the standard serving the East/Gulf coasts in the next ten years. In contrast, the West Coast will likely be served by 8,000 to 10,000 TEU vessels.

With larger vessels able to use the Panama Canal, diversion of Asian imports to the U.S. East and Gulf Coasts may increase. However, the likelihood of this occurring depends on several additional factors. First, it is expected that the Panama Canal Authority will set rates to maximize profits rather than volume, which is likely to result in higher fees. According to the TransPacific Stabilization Agreement, the current rates for canal fees are estimated at $260 per container in Panama and $130 per container in Suez Canal. Additional rates would negate some of the advantage in larger vessels. Second, most ports on the U.S. East and Gulf Coasts are not deep enough to accommodate fully loaded vessels of 6,000 TEUs or greater, which require navigation channels of 50 or more feet. Finally, as indicated earlier, a significant shift of containers from West Coast/intermodal routing to all water services has already occurred.

Shipping via Arctic Routes

Because of reduced sea ice in the Arctic Ocean, interest has grown in shipping via Arctic routes (most notably the Northern Sea Route and the Northwest Passage). Currently there are an estimated 5,000 annual transits, most of which is inter-arctic traffic serving mining, tourism, fisheries, oil, gas, and construction projects associated with the summer sealift. (See Figure 2-24.)

Figure 2-24: Arctic Ocean Marine Routes.



Source: *Arctic Transport Today and Tomorrow; Implications of a Changing Marine Environment at the Top of the World* by Ben Ellis, AMSA co-editor Institute of the North ~ Anchorage, October 2, 2008

The most compelling advantage for using the northern routes occurs from time savings due to a reduction in transit distances. As an example, the distance (nautical miles) from Hamburg to Yokohama is much closer using the arctic route:

- Northern Sea Route ~ 6,920.
- Suez Canal ~ 11,073.
- Panama Canal ~ 12,420.
- Cape of Good Hope ~ 14,542.

Some observers estimate that the number of arctic transits could increase to 10,000 per year[6], with additional service by tankers, containership and bulk carriers. However, the cost-savings from using the Arctic route is not well known at the present time. It is likely that vessels plying this route would be smaller than on other routes (up to 5,000 TEUs), and the vessels may require additional hull protection against threats from the ice. The result is that the shorter distance offered by Arctic routing may be offset by the economies of scale provided by the larger vessels used on other routes. In the future the Arctic route may become competitive in services between Asia and the U.S. East Coast and between Asia and Europe. Since most of the containers imported from Asia through Pacific Northwest ports are destined for the U.S. Midwest, the diversionary impact to Pacific Northwest Ports is expected to be marginal.

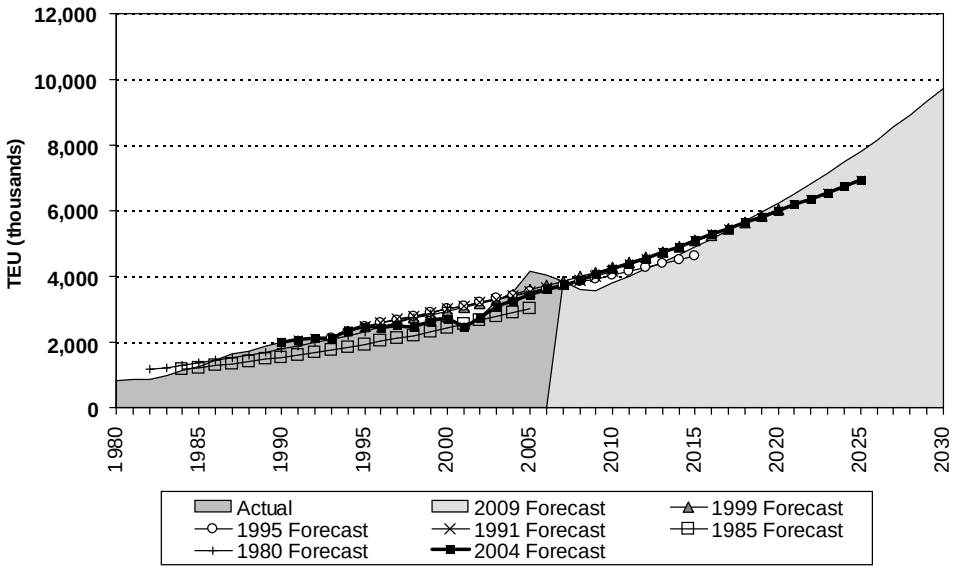
[6] Source: Arctic Seas and Melting Ice: Yale Lecture Series; Text of presentation, September 16, 2008, New Haven, Connecticut, Dr. Walter B. Parker, President, Parker Associates, Inc.

Comparison of Forecasts

Containers

Statewide port forecasts for Washington ports were first performed in 1980, and have been updated at roughly 5-year intervals since then. The 2009 forecasts are the seventh in the series. There is now sufficient data to compare the previous forecasts with the waterborne trade volumes that were actually handled by Washington ports. A comparison of the results of the 1980, 1985, 1991, 1995, 1999 and 2004 forecasts are presented in Figure 2-25, along with the actual volumes.

Figure 2-25: Comparison of Forecasts—Containers (TEU)



Source: BST Associates, IHS Global Insight

One result of the comparison of forecasts with actual figures is that forecasts result in relatively smooth trend lines, while actual figures tend to vary more. As shown in Figure 2-25, in the late 1980s and early 1990s actual container volumes exceeded those forecast in the 1980 and 1985 studies. However, growth in the actual volume of containers flattened out in the late 1990s and early 2000s and then accelerated in 2005 before declining slightly between 2005 and 2007.

The primary reason for the flat growth in the late 1990s and early 2000s was due to a shift of container volumes to new mega-terminals at the Ports of Los Angeles and Long Beach. The growth in 2005 was largely a result of carriers and shippers identifying new gateways during the congestion that occurred in Southern California. Subsequent improvements in Southern California (hiring additional longshoremen, increased terminal capacity through PierPASS and other like improvements) alleviated much of the congestion and container volumes began to be shifted back to Southern California. However, in the long-term, carriers and shippers have expressed an interest in further diversification from Southern California. PNW ports will likely share in some of this diversion.

Actual volumes in 2007 are within 3 percent to 4 percent of the 1995, 1999 and 2004 forecasts.

The 1985 forecast was consistently lower than any of the other forecasts. This may be due to the fact that the 1985 study forecast "containerizable" tonnage rather than actual container numbers.

The TEU figures used in this comparison were estimated by dividing "containerizable" tonnage by eight metric tons per full TEU, which was the average weight in 1985.

The current study projects container volumes less than expected in the 2004 forecast through 2018. After 2018, container volumes are expected to exceed the 2004 forecast.

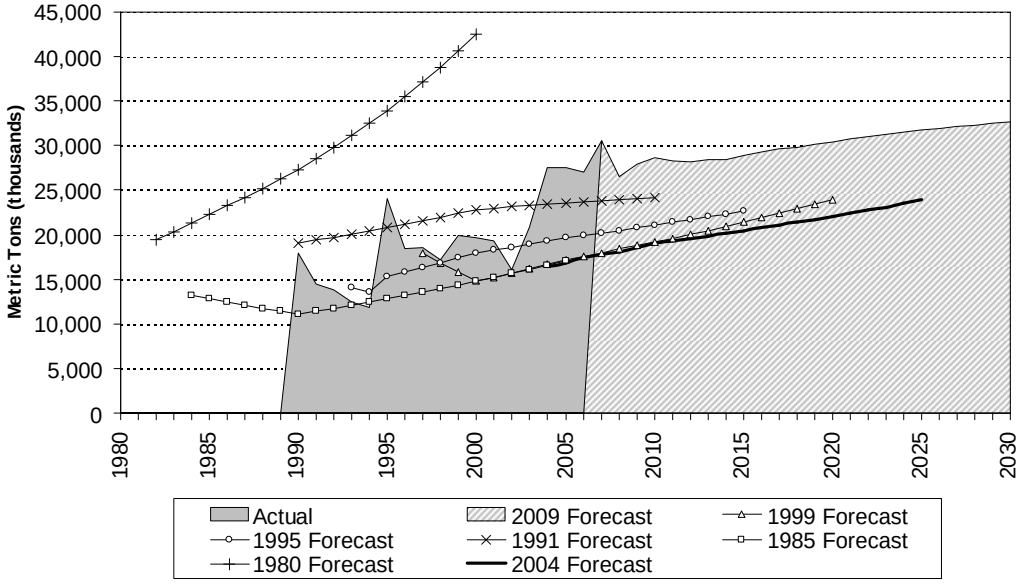
Grain

Even more so than containers, actual grain export volumes exhibit wide fluctuations from year to year. In contrast, forecasts produce smooth trend lines. Despite this fluctuation it is possible to compare prior forecasts with actual results.

In general, each successive forecast has predicted lower grain volumes than the preceding one. The 1980 forecast now appears to have been wildly optimistic, but succeeding projections tracked more closely with actual results until the dramatic increase experienced in the period 2002 to 2007. One of the complications of forecasting trade flows that show wide fluctuations is in choosing the base year from which to project, and this has impacted grain past grain forecasts.

The current forecast starts a higher base but expects less growth. Nonetheless, the long-term projections are much higher than in prior forecasts. (See Figure 2-26.)

Figure 2-26: Comparison of Forecasts – Grain
Washington Ports Only
(1,000 Metric Tons)



Source: BST Associates, IHS Global Insight

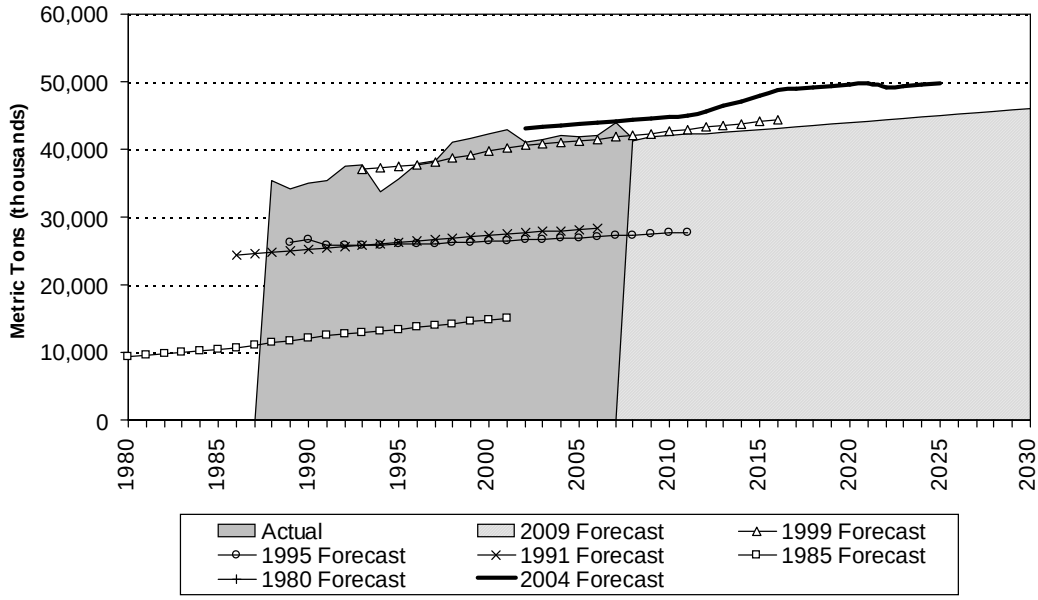
Liquid Bulk

Direct comparison of older liquid bulk forecasts is made difficult due to differences in the reporting between the different studies. Specifically, domestic receipts and shipments were included in some of the forecasts but excluded from others. Since domestic receipts of crude petroleum from Alaska dominate liquid bulks, omission of domestic moves has a substantial affect on the results.

In spite of this, Figure 2-27 reveals that the growth rates used in the different forecasts are relatively similar, and the major difference between the forecasts is the value that was used as a

starting point. For example, the 1999 and 2004 forecasts and the current forecast use nearly identical growth rates but the current forecast uses 2007 as a starting point. The current forecast projects a lower long-term volume than prior forecasts.

Figure 2-27: Comparison of Forecasts—Liquid Bulks
Washington Ports Only
(1,000 Metric Tons)



Source: BST Associates, IHS Global Insight

Chapter 3
Shallow Draft Cargo Trends and Forecasts

Introduction

The Columbia/Snake River System, one of the most important waterway systems in the U.S., begins at the mouth of the Columbia River and extends to Lewiston, Idaho at the confluence of the Snake and Clearwater Rivers.

The existing authorized navigation system provides for a 43-foot deep by 600-foot wide channel from inside the Columbia Bar to Vancouver, Washington on the Columbia River, a distance of 105 miles. The Columbia bar is kept deeper and wider due to shifting sands. The system provides deep-water access to facilities at the Washington ports of Longview, Kalama, Woodland and Vancouver and to the Oregon ports of Astoria, St. Helens and Portland.

After a decision to proceed with deepening in January 2004, the Corps of Engineers issued a Record of Decision (ROD) finalizing the approval process for deepening the channel from 40 feet to 43 feet. This channel improvement will increase the amount of cargo that can be loaded onto ships, increasing efficiency and lowering costs. This will enable ships to access and serve the businesses, farmers, ports, and communities in the region, and will allow the region to maintain a competitive edge in world markets.

Description of the Columbia-Snake River Navigation System

There are eight dams and navigational locks in the Columbia and Snake River that facilitate barge traffic movements. The Columbia River locks are located at the Bonneville, The Dalles, John Day and McNary Dams. The Snake River locks are located at Ice Harbor, Lower Monumental, Little Goose and Lower Granite Dams.

As shown in Table 3-1, the main shallow draft Washington ports are located in the McNary, Lower Granite, and Little Goose pools. Port facilities in Pasco and Walla Walla are located in the McNary pool, port facilities at Clarkston and Wilma are in the Lower Granite pool, and the port facilities at Almota and Central Ferry are located in the Little Goose pool.

All upriver locks have upper and lower miter sills (i.e., the chamber wall under water at each end of the lock channel) of 15 feet. The existence of these locks and authorized maintenance of the river pools at a 14-foot depth allows for low cost transportation of local and regionally produced commodities.

The river system has typically been managed to approximately 4 to 5 feet above minimum pool depending on the pool, in order to maintain a minimum 14-foot depth within the channel. However, the consideration of dam breaching or flow augmentation alternatives to enhance salmon revitalization efforts places these operating systems in jeopardy, because the locks would become "stranded" above lower than minimum required levels.

The barge system has evolved to take maximum advantage of the authorized minimum pool characteristics. "Jumbo" grain barges capable of carrying 3,600 tons of grain have become the mainstay of the wheat export fleet and are the largest vessels on the river system, drawing 13.5 feet. Container and other barges typically have a draft of ten to 11 feet. Larger tugs typically push four barges and have a draft of 11 to 12 feet.

There are barge or vessel docks in 17 Washington port districts along the river system. The dams on the upper Columbia River above the Tri-Cities do not have navigation locks.

Table 3-1: Cargo Facilities on the Columbia/Snake Shallow-Draft Navigation Channel

Pool/River Mile	Facility	Commodities
Lower Granite		
2[1]	Lewiston, ID	Grain, logs, containers, peas, lentils
138	Clarkston, WA	Grain, containers, logs
135	Wilma, WA	Grain, wood, cement, petroleum
Little Goose		
104	Almota, WA	Grain
83	Central Ferry, WA	Grain, fertilizer
83	Garfield, WA	Grain
Lower Monumental		
61	Lyons Ferry, WA	Grain
Ice Harbor		
38	Windust, WA	Grain
29	Sheffler, WA	Grain
McNary		
2[2]	Burbank, WA	Grain
328	Pasco, WA	Petroleum, chemicals, fertilizer, plate glass
328	Kennewick, WA	Chemicals, petroleum
314	Wallula, WA	Grain
412	Port Kelley, OR	Grain
293	Umatilla, OR	Containers, logs, woodchips, general cargo
John Day		
275	Morrow, OR	Grain, containers, logs, wood chips
240	Roosevelt, WA	Grain
240	Arlington, OR	Grain
278	Hogue—Warner, OR	Containers, logs, woodchips, general cargo
The Dalles		
208	Biggs, OR	Grain
Bonneville		
190	The Dalles, OR	Wood chips, grain
190[3]	Klickitat, WA	Lumber, grain, aggregate

[1] On the Clearwater River

[2] Beginning of Snake River System Locks

[3] Beginning of Columbia River System Locks

Source: U.S. Army Corps of Engineers

Cargo Trends

Columbia River Shallow Draft Cargo Trends

Grain moving downstream is the lifeblood of the barging system on the Columbia/Snake River System. From 1993 through 2007, grain accounted for an average of 53 percent of all commodity tonnage moving on the Columbia River portion of the system, as measured at the Bonneville Lock and Dam. Upbound movements of petroleum products are also key, accounting for an average of 20 percent of cargo movements at Bonneville. Other commodities, such as forest products, sand and gravel, chemicals and fertilizer, and garbage made up the remainder.

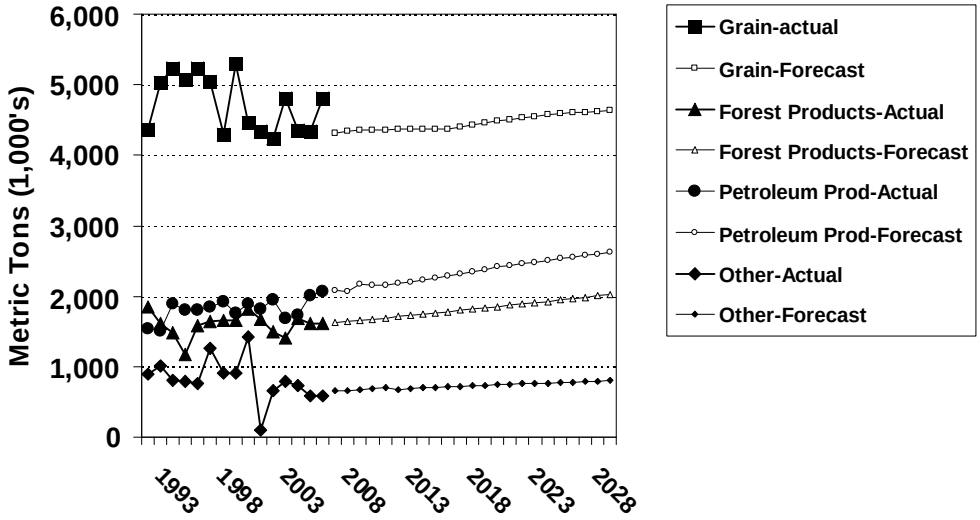
Overall traffic growth on the Columbia River portion of the Columbia/Snake River shallow draft system is projected to average growth of 0.5 percent per year through the year 2030.

However, this rate is in large part a reflection of volumes being higher than average in 2007. An adjustment was made in the forecasts to account for this year by decreasing grain shipment levels to those experienced in earlier years.

Forest products are projected to average 1.0 percent growth for the period of 2007 through 2030. Grain is projected to decline slightly relative to the levels in 2007, but 2007 was a high export year. Grain averages 0.3 percent growth from 2006 to 2030.

Movements of petroleum products are projected to grow by 1.1 percent per year through 2025, while other commodities are projected to grow by 1.3 percent.

Figure 3-1: Shallow Draft Forecast—Columbia River



Source: BST Associates, IHS Global Insight

Table 3-2: Shallow Draft Trends and Forecast—Columbia River (1,000 Metric Tons)

Year	All Grain	Paper and Pulp	Petroleum Products	Wood Products	Other	Total
Actual						
2002	4,335	232	1,820	1,440	106	7,934
2003	4,244	174	1,951	1,324	662	8,355
2004	4,811	170	1,689	1,237	785	8,691
2005	4,358	92	1,738	1,593	733	8,515
2006	4,344	143	2,003	1,471	583	8,543
2007	4,811	165	2,072	1,446	594	9,089
Forecast						
2010	4,354	170	2,168	1,490	672	8,854
2015	4,369	179	2,230	1,566	703	9,048
2020	4,455	188	2,383	1,646	733	9,405
2025	4,570	198	2,509	1,730	769	9,776
2030	4,636	208	2,622	1,818	804	10,088
Average Annual Growth Rates						
2002-2007	2.1%	-6.6%	2.6%	0.1%	41.1%	2.8%
2007-2010	-3.3%	1.0%	1.5%	1.0%	4.2%	-0.9%
2010-2015	0.1%	1.0%	0.6%	1.0%	0.9%	0.4%
2015-2020	0.4%	1.0%	1.3%	1.0%	0.8%	0.8%
2020-2025	0.5%	1.0%	1.0%	1.0%	1.0%	0.8%
2025-2030	0.3%	1.0%	0.9%	1.0%	0.9%	0.6%
2007-2030	-0.2%	1.0%	1.0%	1.0%	1.3%	0.5%

* Rate is based on growth between average of 1998-2002 and 2005
Note: Cargo volumes as measure at Bonneville Lock
Source: BST Associates, IHS Global Insight

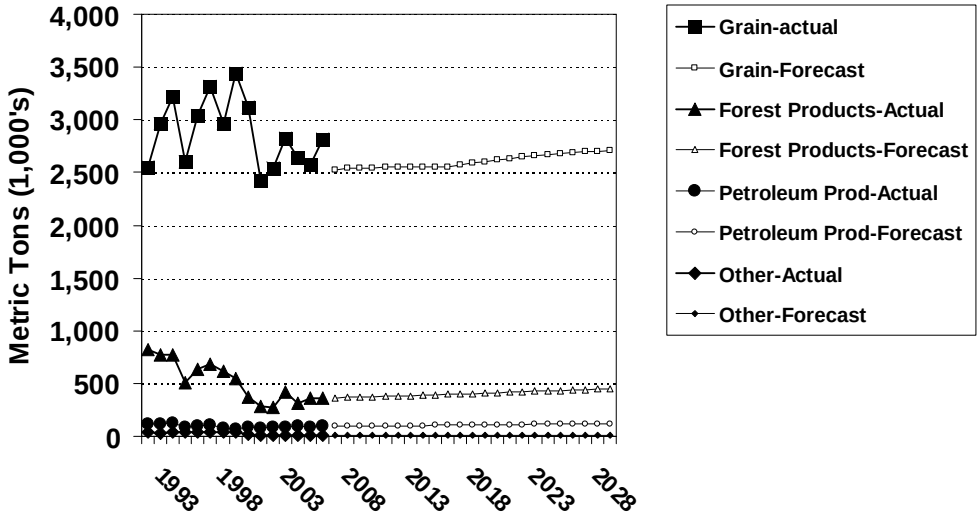
Snake River Cargo Trends

On the Snake River a relatively small volume of cargo is barged upstream, and the majority of the downbound cargo is grain. Downbound grain movements account for an average of 82 percent of Snake River tonnage, as measured at Ice Harbor Lock and Dam. From 1993 through 2007 forest products accounted for an average of 14 percent of Snake River tonnage. The remaining tonnage is divided between petroleum products (3 percent) and "other" (1 percent).

As with volumes on the Columbia River, the cargo forecasts for the Snake River portion of the Columbia/Snake River shallow draft system are based on an adjusted number. Because volumes in 2007 were substantially higher than normal, the forecasts were adjusted downward to 2.5 million tons in 2007.

The overall growth rate for Snake River tonnage is projected to average 0.3 percent per year from 2006 through 2030. Paper and pulp are expected to see the fastest growth, averaging 2.0 percent for the forecast period. Other forest products will grow much more slowly, averaging 0.6 percent per year. Grain movements are projected to grow by an average of 0.2 percent per year. Petroleum products are forecast to grow by 1.4 percent per year for the forecast period.

Figure 3-2: Shallow Draft Forecast—Snake River



Source: BST Associates, IHS Global Insight

Table 3-3: Shallow Draft Trends and Forecast—Snake River (1,000 Metric Tons)

Year	All Grain	Paper and Pulp	Petroleum Products	Wood Products	Other	Total
Actual						
2002	2,421	152	83	130	12	2,799
2003	2,542	76	91	202	9	2,920
2004	2,828	95	92	321	8	3,344
2005	2,642	27	94	286	13	3,062
2006	2,573	83	86	278	14	3,033
2007	2,813	107	94	253	9	3,276
Forecast						
2010	2,545	110	99	261	11	3,025
2015	2,554	115	101	274	11	3,056
2020	2,604	121	108	288	11	3,134
2025	2,671	128	114	303	12	3,228
2030	2,710	134	119	318	13	3,294
Average Annual Growth Rates						
2002-2007	3.0%	-6.9%	2.7%	14.2%	-5.3%	3.2%
2007-2010	-3.3%	1.0%	1.5%	1.0%	4.2%	-2.6%
2010-2015	0.1%	1.0%	0.6%	1.0%	0.9%	0.2%
2015-2020	0.4%	1.0%	1.3%	1.0%	0.8%	0.5%
2020-2025	0.5%	1.0%	1.0%	1.0%	1.0%	0.6%
2025-2030	0.3%	1.0%	0.9%	1.0%	0.9%	0.4%
2007-2030	-0.2%	1.0%	1.0%	1.0%	1.3%	0.0%

* Rate is based on growth between average of 1998-2002 and 2005
Note: Cargo volumes as measure at Ice Harbor Lock
Source: BST Associates, IHS Global Insight

The importance of the Snake River to overall cargo volumes carried on the Columbia/Snake River shallow draft system can be illustrated by comparing the relative volumes moved on each river. Cargo tonnage for the Snake River at the Ice Harbor Lock was divided by tonnage at the

Bonneville Lock, and the results of this are presented in the Table 3-4. As shown, the Snake River accounted for 36 percent of all system tonnage in 2007.

Table 3-4: Relative Size of Snake River Barge Volumes
Snake River as a Share of Columbia River

Year	All Grain	Paper and Pulp	Petroleum Products	Wood Products	Other	Total
Actual						
2002	56%	66%	5%	9%	11%	35%
2003	60%	44%	5%	15%	1%	35%
2004	59%	56%	5%	26%	1%	38%
2005	61%	29%	5%	18%	2%	36%
2006	59%	58%	4%	19%	2%	36%
2007	58%	65%	5%	18%	2%	36%
Forecast						
2010	58%	65%	5%	18%	2%	34%
2015	58%	65%	5%	18%	2%	34%
2020	58%	65%	5%	18%	2%	33%
2025	58%	65%	5%	18%	2%	33%
2030	58%	65%	5%	18%	2%	33%

Source: BST Associates using data from the U.S. Army Corps of Engineers

The Snake River is most important for grain and pulp and paper. The tonnage of grain moving through the Ice Harbor Lock is 58 percent of that moving through the Bonneville lock, while for pulp and paper that share is 67 percent. The Snake River handles relatively little of the petroleum products or other (miscellaneous) commodities.

River Barging As An Integrated System

The Columbia/Snake River system is integrated and interdependent. As mentioned previously, grain is the largest volume commodity. Eastern Washington wheat and barley farmers have a choice and can ship through any of the various upriver terminals in Idaho, Oregon or Washington depending on the needs of the buyer, the location of the farm, participation by the farmer in a Co-op, relative inland freight costs, and various other competitive factors.

Grain is also trucked to these upriver terminals from Montana, the Dakotas and even as far away as Minnesota. Typically, these long-distance moves are a backhaul cargo, with the front haul comprising shipment of forest products and vegetables from Walla Walla, the Tri-Cities or Lewiston to the Midwest.

In the case of containerized cargo, other critical factors for the barge system include the availability of steamship service at Portland and the health of the grain industry, as container barges move most economically in conjunction with a tow of grain barges. Cargo movements by barge on the Columbia and Snake rivers must be analyzed within the context of a total "transportation system" that involves three important elements.

- Combined domestic and import/export barge movements. Tug and barge operations typically involve several barges carrying different commodities being moved in a combined tow with a single towboat. The viability and growth of this system hinges on products moving in both international trade (imports and exports) and domestic trade (shipments that are purely of an intrastate or interstate nature).

- Combined barge activity from Oregon, Washington and Idaho. There are no commodity groups that involve movements of either import/export cargo or domestic cargo solely between upriver Washington ports and deepwater Washington ports on the Lower Columbia River. Rather, every cargo category is characterized by products that: (1) are produced in more than one state, (2) are shipped through upriver ports in more than one state, and (3) move through deepwater ports in both Oregon and Washington. An example is wheat grown in Idaho, Washington and Oregon, moving through upriver elevators in all three states and being barged to deepwater elevators in both Oregon and Washington.
- Distinctions between cargo origin points and ports used. In many cases, the distinction must be drawn between where products are produced and which upriver ports actually handle the cargo. Much of the cargo that moves through Port of Lewiston in Idaho is actually cargo originating in the state of Washington. Conversely, products handled at the Washington ports of Wilma and Clarkston include a mix of products of Washington and Idaho origin. To put this into perspective, a distinction must be made between international trade activities in the producing areas of Washington as distinct from international cargo actually being handled by Washington's upriver ports.

The integrated nature of this system can be best understood by looking at the typical tug and barge operation on the river system. Towboats on the river typically push as many as six or seven barges of various types in one tow including petroleum barges, grain barges, wood chip barges and container barges. On a single round trip, a towboat may transport barges to and from upriver ports in Washington, Oregon and Idaho. With this type of integrated operation, both the frequency of service and rates charged for barge transportation depend on the combined total of all products moving, whether in international or domestic trade. No individual commodity by itself determines either the frequency of scheduled service or the transportation rates charged. However, because of its sheer size and requirements, grain dominates barge rate determination.

Cargo Trends

Grain

In terms of tonnage, grain is the leading commodity moving by barge on the Columbia/Snake River system. Grain moves through 29 elevators located on the upper Columbia/Snake River system, 17 of which are located in the state of Washington.

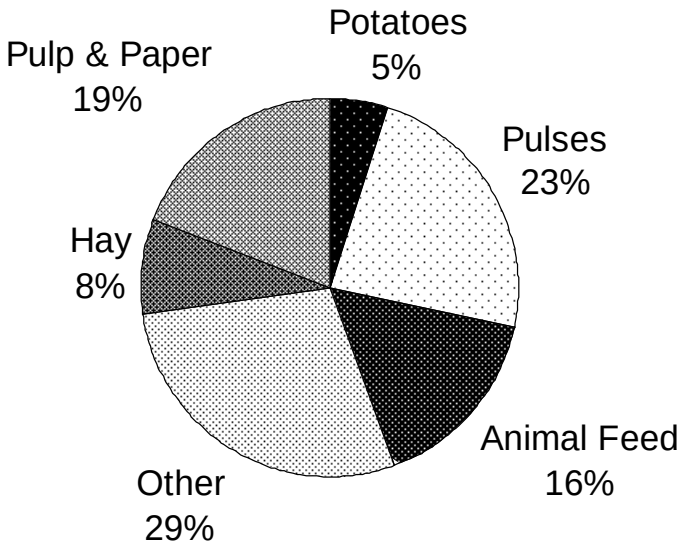
The largest volumes of grain are generated in the McNary pool (1.0 to 1.8 million metric tons), and the Little Goose and Lower Granite pools (0.8 to 1.3 million metric tons per pool). The rest of the pools generate from less than 100,000 metric tons per year to nearly 800,000 metric tons.

Containers

Portland's Terminal 6 is the region's barging connection from inland producers to Pacific Rim markets and beyond. Container barging connects Terminal 6 to four shallow-draft upriver ports on the Columbia/Snake river system: Boardman and Umatilla, Oregon; Pasco, Washington; and Lewiston, Idaho, which is the farthest inland port at 465 miles from the Pacific Ocean.

Since container barge service began on the Columbia and Snake rivers in 1975, the volume of containers barged through Portland has reached levels as high as 50,000 per year. Currently, the only ports on the Washington side with container barge service are Pasco and Clarkston. In 1997 approximately 4,300 containers moved between Pasco and Portland, up from 1,200 in 1990 and representing an average annual growth rate of more than 20 percent.

Figure 3-3: Containerized Commodities Shipped Via Columbia/Snake River Barge

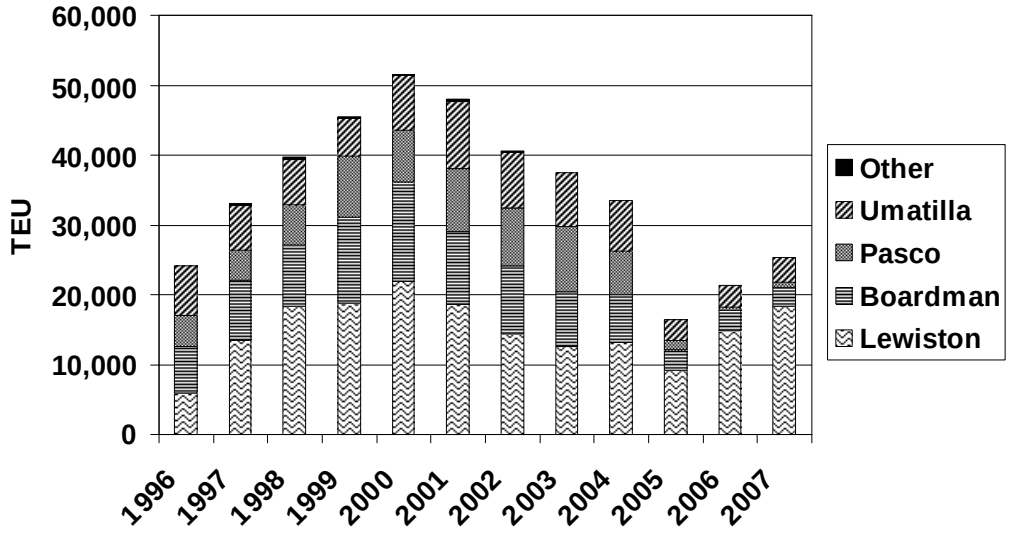


Source: Port of Portland

Lewiston's barged traffic declined from a peak of 21,000 containers (total Upbound and Downbound) in 2000 to a low of 9,200 in 2005 due to the loss of container service in Portland. However, volumes have since built up to 18,500 containers in 2007 as Portland has attracted additional container service.

Traffic at other barge ports has declined. In particular, Pasco's container volume has fallen significantly in the last two years as has Boardman and Umatilla.

Figure 3-4: Barge Container Ports on the Columbia/Snake System



Source: Port of Portland

Wood Products

Most of the movements of logs on the Columbia/Snake River shallow draft system are generated in the Lower Granite pool, which includes port facilities in Lewiston and Clarkston. The Lower Granite tonnage is followed distantly by facilities in Bonneville, Lower Monumental and Ice Harbor pools.

Pulp and Paper

Two mills (Potlatch in Lewiston, Idaho and Boise Cascade at Wallula, Washington) produce woodpulp that is exported via the ports of Longview and Portland, as well as through Seattle and Tacoma. Until recently this traffic was moved primarily by barge.

Petroleum Products

The majority of upbound petroleum products originate downstream of the Bonneville Lock and are shipped to the Tri-Cities. The majority of the petroleum product shipped upriver by barge originates at Puget Sound refineries and is moved to barge loading facilities in Vancouver. In addition to the Tri-Cities a limited volume of this cargo also continues up the Snake River to Lewiston.

Impacts of Dam Breaching

Proposals to breach the dams on the lower Snake River in an effort to enhance the survivability of various endangered species of fish could have a serious and negative impact on barge transportation on the Columbia River. Whether such an action would actually help the fish is uncertain, but the effects on shippers on the region is likely to be quite negative, with higher transportation costs and lower levels of service as a result.

Transportation System Impacts

The current Snake River barge system is very efficient for moving cargo. The barge system provides shippers with an alternative to shipping by rail, imposes price competition on the railroads, and supplies sufficient capacity to absorb substantial fluctuations in grain shipments, especially during peak export months and years.

The major components of the existing barge transportation system include:

- Barge terminals and river elevators,
- Access roads to the barge terminals and river elevators,
- Navigation channel,
- Barge fleet, and
- Export elevators.

Siltation has been problematic in the McNary Dam pool, which is the first Columbia River dam below the Snake River. If the Snake River dams were to be breached, much of the grain (and other commodities) that is now barged on the Snake River could be expected to shift to loading or unloading facilities in the McNary pool. Elimination of barge transportation on the lower Snake River will necessarily result in a less efficient system.

In addition to the effect that dam breaching would have on the barge system, transportation impacts would also be shifted to the road and rail systems in the region. The mainline rail system, short-line rail system, and state and county road systems could all be expected to bear an increased share of the freight now shipped by barge. This could cause capacity constraints to be reached.

The short-line rail system can also be expected to handle an increased volume of grain if the Snake River dams are breached. Unfortunately, the short-line railroads that currently operate in the grain-producing region of Eastern Washington only generate enough revenue to cover operating costs, and are not generally able to finance capacity upgrades.

Rail elevators may also require substantial capital improvements if they are to handle the grain expected to shift from barge transportation. Many of these elevators have not been used for rail loading in years, and the condition of their equipment is unknown. In addition, the rail sidings at many of these elevators are long enough for only three cars, while the current standard is sidings for a minimum of 25 or 26 cars.

The highway system will also face increased costs, due to shifting transportation patterns. Roads that were not designed and constructed to handle large volumes of truck traffic can be expected to face increased maintenance costs.

Rate Impacts

The fact that the region served by the Snake River barge system is also served by railroads means that neither mode of transportation is able to charge monopoly rates for service. Breaching the Snake River dams, however, would decrease competition and would likely lead to rate increases.

According to the National Corn Growers Association, “it has been demonstrated numerous times that areas throughout the country that do not have access to barge transportation have higher rail rates.” The Tennessee Valley Authority examined the effect of barge transportation on rail rates on the upper Mississippi River, and concluded that “the continued availability of water transport appears to have a significant impact on the pricing behavior of other surface transportation modes—

at least when these modes are reasonably close to the river. In particular, there is a large body of economic literature, which suggests that available barge transportation effectively constrains railroad pricing for the transportation of commodities that are appropriately moved by barge. These barge-constrained rail prices have come to be called 'water-compelled' rates."

Chapter 4
Modal Shares and Corridors

Introduction

The land transportation network continues to serve as the lifeline that links industrial plants, farms and forests with cities and ports, and connects products with both local and distant markets. A large percentage of the Washington State economy is inextricably linked either directly or indirectly to offshore domestic commerce and international trade. As a result, the efficient performance of the highway, rail and waterways systems are of critical importance for moving freight to and from the ports. The following chapter reviews the inland transportation component of waterborne commerce, focusing on the modes of transport that bring cargo to terminals for export and that distribute import cargo from the terminals.

Existing Cargo Throughput

From 1998 through 2006 (the last data available), Washington State ports handled between 91.5 and 110.5 million tons of waterborne commerce per year. Volumes declined in 2001 and 2002 as a result of deteriorating economic conditions coupled with a strong U.S. dollar but increased in 2003 through 2005. In 2006, Washington State's ports handled 109.5 million tons of cargo, with 38.1 million tons of exports, 25.6 million tons of imports, and the remainder on domestic routes (23.0 million tons inbound and 13.3 million tons outbound).

Table 4-1: Waterborne Commerce in 2002 via Washington State Ports (1,000 Metric Tons)

		Shipping		Receiving		
Year	Totals*	Domestic	Foreign	Domestic	Foreign	Intrastate
1998	92,957	11,725	26,201	25,946	16,006	13,079
1999	101,401	11,219	30,544	24,796	18,441	16,399
2000	103,177	14,428	28,099	25,426	16,723	18,500
2001	95,233	13,476	28,057	27,321	14,272	12,107
2002	91,530	10,681	26,248	26,513	16,574	11,514
2003	96,606	12,096	29,821	26,744	17,671	10,274
2004	106,766	13,731	36,082	25,687	20,293	10,973
2005	110,533	13,345	36,995	24,868	23,983	11,341
2006	109,982	13,319	38,101	23,037	25,655	9,868
98-06	2.1%	1.6%	4.8%	-1.5%	6.1%	-3.5%

Source: BST Associates using data from the U.S. Army Corps of Engineers

The cargo base is composed of foreign imports and exports and domestic shipments and receipts. Domestic traffic primarily includes trade with Alaska, Hawaii and Southern California, but also includes local traffic[7] (i.e., traffic within a single harbor), internal traffic (e.g., traffic moving within Puget Sound), and waterway traffic such as grain barged down the Snake and Columbia Rivers to Lower Columbia export elevators.

[7] Please note that local and internal harbor traffic are not included in the remaining sections of this report.

Modal Distribution of Freight

Imports and exports through Washington State ports move to their final destination and/or arrive at the port via several modes of transport including rail, truck, barge/raft or direct movement into a plant (or distribution facility) for consumption.

- Rail transport is the preferred mode for large volumes of cargo moving at least 500 miles, such as containerized Asian imports destined for Chicago and New York. Rail can also be efficient for moving large volumes of heavier cargo on shorter routes, such as petroleum coke movements from Ferndale to Longview or alumina from Tacoma to Spokane.
- Truck transport is more likely for cargoes moving within the state or region.
- Barge transport is used from upriver elevators on the Columbia/Snake River system and accounts for a substantial portion of grain exports via Lower Columbia ports. In addition, barge transport connects Puget Sound ports with shippers on the Olympic Peninsula and in British Columbia; logs are frequently barged or rafted from one port to another for export or to a mill for use as an input to production.
- Finally, commodities may be directly consumed at a plant. For example, imports of limestone, gypsum, salt and other like products often move directly into a manufacturing plant for processing into cement, sheetrock, chemicals or other products.

The following estimate of modal distribution focuses on the primary movement of the commodity, because it is not feasible to track the final destinations of manufactured products created at waterfront plant locations. For example, the gypsum can be traced to a manufacturing plant, but the sheetrock produced cannot be tracked to its final destination using available databases. This is also true for commodities that are moved through a central distribution facility and later are transported to market.

Lower Columbia Washington Ports

More than 80 percent of the freight shipped and received via Lower Columbia ports in Washington is moved by rail or barge. Total tonnage moved through the combined ports of Longview, Kalama, and Vancouver in 2007 was estimated at 18.6 million tons[8]. Rail accounted for 72 percent of the traffic flows, barge/raft 11 percent, truck 10 percent, and direct moves to plants accounted for 6 percent.

The overall rate of growth of cargo for the Lower Columbia is forecast to average 0.7 percent per year from 2007 through 2030. Cargo carried by truck is projected to grow an average of 1.0 percent per year; direct moves to plant by 1.5 percent per year; freight moved by rail is projected to grow by an average of 0.7 percent per year, and that shipped via barge is forecast to decline slightly by -0.4 percent per year. Barge has particular importance for Washington State because nearly all of the barged traffic consists of PNW wheat and barley producers, while rail is predominantly used for Midwest grain exports and other dry bulks.

Truck traffic in Lower Columbia Washington ports primarily consists of movements of breakbulk and log exports. Direct moves to manufacturing/distribution plants are not as numerous on the Lower Columbia as on Puget Sound. However, some notable exceptions include the Steelscape plant in Kalama receiving imports of steel coil directly across the dock to the plant, and

[8] This cargo base excludes internal shipments, which were included in the 1999 Marine Cargo Study.

some paper mills on the Lower Columbia receiving wood chips and shipping forest products by barge.

Table 4-2: Lower Columbia Washington Port Modal Shares
International and Domestic Freight (1,000 metric tons)

	Metric Tons (1,000s)					Percent by Mode			
Year	Rail	Truck	Barge/ Raft	Plant	Total	Rail	Truck	Barge/ Raft	Plant
Actual									
2002	8,871	1,984	1,625	766	13,245	67%	15%	12%	6%
2003	9,494	1,930	1,913	882	14,218	67%	14%	13%	6%
2004	12,225	2,058	1,864	819	16,965	72%	12%	11%	5%
2005	11,544	1,958	1,563	1,233	16,297	71%	12%	10%	8%
2006	11,465	1,993	1,918	1,110	16,486	70%	12%	12%	7%
2007	13,407	1,896	2,100	1,173	18,576	72%	10%	11%	6%
Forecast									
2010	13,453	2,045	1,787	1,298	18,583	72%	11%	10%	7%
2015	14,049	2,162	1,800	1,380	19,392	72%	11%	9%	7%
2020	14,767	2,252	1,838	1,478	20,335	73%	11%	9%	7%
2025	15,412	2,319	1,889	1,567	21,186	73%	11%	9%	7%
2030	15,909	2,372	1,918	1,653	21,852	73%	11%	9%	8%
Avg Annual Growth Rate									
2002-2007	8.6%	-0.9%	5.3%	8.9%	7.0%				
2007-2010	3.1%	0.9%	2.7%	1.0%	2.7%				
2010-2015	0.9%	1.1%	0.1%	1.2%	0.9%				
2015-2020	1.0%	0.8%	0.4%	1.4%	1.0%				
2020-2025	0.9%	0.6%	0.5%	1.2%	0.8%				
2025-2030	0.6%	0.5%	0.3%	1.1%	0.6%				
2007-2030	0.7%	1.0%	-0.4%	1.5%	0.7%				

Source: BST Associates, assumes cargo volumes after deepening of the Columbia River

Puget Sound Ports

Puget Sound ports receive and ship a much larger share of their cargo by truck and rely less on barge than Lower Columbia ports. Statistically, the largest share of waterborne traffic on Puget Sound, in terms of tonnage, is handled directly at the plant, due to the high volume of Alaskan crude oil to refineries, which tend to overshadow the importance of other cargo movements. In 2007 a total of 33 million metric tons of cargo were handled directly at the plant (mostly crude oil, sand and gravel, limestone, gypsum and other primarily bulk materials), while another 48 million tons were handled by other modes including truck, rail, and barge/raft.

In 2007 truck-borne cargo represented a lower share of cargo than rail (24 percent by truck versus 34 percent by rail), mainly due to the dramatic increase in grain exports. Truck traffic includes much of the export cargo produced in the Pacific Northwest as well import cargo destined for this region. Rail tonnage is dominated by corn, soybeans and sorghum shipped in from the Midwest, but is also critical for containerized cargo and automobiles. Through the time period covered by this forecast, rail traffic is projected to grow at 2.5 percent per year, slightly slower than truck traffic at 2.8 percent per year. The volume of freight moved by barge and raft is small in comparison with the rail and truck modes, but serves an important purpose. First, virtually all cargo

shipped to and from Southeast and Western/Arctic Alaska is moved by barge to or from Seattle. Forest products would also face increased costs without the barging and rafting of logs. Barge/raft traffic is projected to rise at an average 0.9 percent per year over the span of this forecast, rising from 698,000 metric tons in 2007 to 1.1 million metric tons in 2030.

Approximately 41 percent of Puget Sound waterborne commerce (domestic and international) originates at or is destined for a waterfront plant. This includes imports of crude oil, sand and gravel, limestone, gypsum, salt and other like commodities. Domestic receipts of crude oil from Alaska accounted for the largest share of this type of traffic, but the construction industry, in particular, would face higher costs if the low-cost movement of cement and aggregates from Canada and Puget Sound was not available.

Table 4-3: Puget Sound Port Modal Distribution
(1,000 Metric Tons)

	Metric Tons (1,000s)					Percent by Mode			
	Rail	Truck	Barge/ Raft	Plant	Total	Rail	Truck	Barge/ Raft	Plant
Actual									
2002	15,716	15,081	541	30,729	62,067	25%	24%	1%	50%
2003	19,145	15,093	555	33,248	68,040	28%	22%	1%	49%
2004	24,517	17,701	616	33,695	76,529	32%	23%	1%	44%
2005	28,343	21,529	762	36,741	87,375	32%	25%	1%	42%
2006	28,020	20,055	702	35,521	84,298	33%	24%	1%	42%
2007	28,088	19,342	698	33,342	81,470	34%	24%	1%	41%
Forecast									
2010	26,915	19,221	680	36,726	83,543	32%	23%	1%	44%
2015	30,766	22,964	767	35,517	90,014	34%	26%	1%	39%
2020	36,428	26,972	857	29,710	93,968	39%	29%	1%	32%
2025	42,651	31,323	958	36,041	110,974	38%	28%	1%	32%
2030	49,869	36,215	1,077	43,008	130,169	38%	28%	1%	33%
Avg Annual Growth Rate									
2002-2007	12.3%	5.1%	5.2%	1.6%	5.6%				
2007-2010	-1.0%	-2.2%	-2.2%	0.0%	-0.9%				
2010-2015	2.7%	3.6%	2.4%	-0.7%	1.5%				
2015-2020	3.4%	3.3%	2.2%	-3.5%	0.9%				
2020-2025	3.2%	3.0%	2.3%	3.9%	3.4%				
2025-2030	3.2%	2.9%	2.4%	3.6%	3.2%				
2007-2030	2.5%	2.8%	1.9%	1.1%	2.1%				

Source: BST Associates

Modal Distribution of Key Cargo Handling Groups

The following section summarizes the modal distribution of major commodity handling groups, including containers, breakbulk, dry and liquid bulks, logs, grain, and motor vehicles.

Containers

Trucks currently account for approximately 57 percent of total container tonnage and dominate in the export and domestic sectors, while rail dominates imports. Over the span of this forecast containerized traffic moved by truck is projected to increase from 12.5 million tons in 2007 to 27.6 million tons in 2030, representing an average rate of growth of 3.5 percent per year. However, the growth in rail traffic will continue to outpace growth in truck traffic, and as a result, truck volumes will decline from 57 percent of total containerized tonnage to 49 percent by the end of the study period. (See Table 4-4).

Table 4-4: Puget Sound Container Traffic
(1,000s of Metric Tons and Percent by Mode)

	Metric Tons (1,000s)					Percent by Mode			
	Rail	Truck	Barge/ Raft	Plant	Total	Rail	Truck	Barge/ Raft	Plant
Actual									
2002	6,069	8,607	125	313	15,114	40%	57%	1%	2%
2003	6,966	9,090	140	350	16,546	42%	55%	1%	2%
2004	7,627	10,778	163	408	18,976	40%	57%	1%	2%
2005	9,985	14,091	214	534	24,824	40%	57%	1%	2%
2006	9,538	12,999	202	504	23,243	41%	56%	1%	2%
2007	8,964	12,519	191	477	22,151	40%	57%	1%	2%
Forecast									
2010	8,657	12,492	186	466	21,802	40%	57%	1%	2%
2015	11,922	15,602	250	624	28,398	42%	55%	1%	2%
2020	15,944	19,114	325	812	36,195	44%	53%	1%	2%
2025	20,862	23,047	414	1,034	45,356	46%	51%	1%	2%
2030	27,018	27,605	522	1,304	56,448	48%	49%	1%	2%
Avg Annual Growth Rate									
2002-2007	8.1%	7.8%	8.8%	8.8%	7.9%				
2007-2010	-2.8%	-2.4%	-2.7%	-2.7%	-2.6%				
2010-2015	6.6%	4.5%	6.0%	6.0%	5.4%				
2015-2020	6.0%	4.1%	5.4%	5.4%	5.0%				
2020-2025	5.5%	3.8%	4.9%	4.9%	4.6%				
2025-2030	5.3%	3.7%	4.7%	4.7%	4.5%				
2007-2030	4.9%	3.5%	4.5%	4.5%	4.2%				

Source: BST Associates

It should be noted that while the movement of containers by rail is relatively balanced, a substantial number of containers are empty on the westbound movement to the ports. Many empty containers are trucked from the ports, filled with local Pacific Northwest cargo, and returned by truck, thus somewhat increasing the overall truck count. Approximately 95 percent of all domestic container traffic (mainly comprised shipments to Alaska and Hawaii) flows to and from the ports by truck.

Outside the Puget Sound area a small number of containers carrying agricultural goods are moved from Columbia/Snake River ports to the Port of Portland. These exports, which are not included in Table 4-4, move by truck and barge.

Breakbulk/Neobulk (includes logs, autos and all other neobulk/breakbulk cargoes)

Breakbulk cargo on the Lower Columbia is, for the most part, moved to and from port facilities by truck. The majority of this truck-transported breakbulk cargo is logs, and most of these logs are harvested near the port of export. In 2007, trucks accounted for 64 percent of Lower Columbia breakbulks, but this share is projected to fall slightly to 61 percent in 2030. This decline is primarily due to a decrease in log exports relative to other cargo movements.

Rail traffic accounts for 27 percent of this traffic base at the present time and is expected to increase to 33 percent by 2025. Most of the rail tonnage is accounted for by automobiles and steel coils, while most of the cargo moving directly between plant and water is forest products and steel products.

Table 4-5: Lower Columbia Port Breakbulks/Neobulks (1,000s of Metric Tons, Percent by Mode)

	Metric Tons (1,000s)					Percent by Mode			
	Rail	Truck	Barge/ Raft	Plant	Total	Rail	Truck	Barge/ Raft	Plant
Actual									
2002	669	1,690	16	183	2,559	26%	66%	1%	7%
2003	627	1,722	14	168	2,531	25%	68%	1%	7%
2004	716	1,801	14	204	2,735	26%	66%	1%	7%
2005	662	1,661	12	190	2,524	26%	66%	0%	8%
2006	761	1,710	11	259	2,742	28%	62%	0%	9%
2007	706	1,662	11	207	2,586	27%	64%	0%	8%
Forecast									
2010	812	1,807	11	242	2,873	28%	63%	0%	8%
2015	892	1,909	12	240	3,053	29%	63%	0%	8%
2020	972	1,985	12	234	3,203	30%	62%	0%	7%
2025	1,050	2,042	12	224	3,329	32%	61%	0%	7%
2030	1,130	2,090	13	210	3,443	33%	61%	0%	6%
Avg Annual Growth Rate									
2002-2007	1.1%	-0.3%	-8.0%	2.5%	0.2%				
2007-2010	4.2%	1.7%	-1.9%	5.0%	2.6%				
2010-2015	1.9%	1.1%	1.1%	-0.2%	1.2%				
2015-2020	1.7%	0.8%	0.7%	-0.5%	1.0%				
2020-2025	1.6%	0.6%	0.5%	-0.9%	0.8%				
2025-2030	1.5%	0.5%	0.4%	-1.3%	0.7%				
2007-2030	2.1%	1.0%	0.8%	0.1%	1.3%				

Source: BST Associates

Puget Sound breakbulk and neobulk traffic is mainly handled by truck, although other modes are expected to grow more rapidly in the future. In 2007, 80 percent of the cargo moving overland to and from the ports was carried in trucks, but this share is projected to decline slightly to 77 percent by the year 2025.

The share of breakbulk/neobulk cargo transported via rail is expected to grow from 15 percent of total in 2007 to 18 percent of total in 2030. This cargo mainly consists of automobiles and steel coils.

Direct moves from waterfront plants are expected to remain at approximately one percent of breakbulk/neobulk moves.

Barging and rafting accounted for five percent of breakbulks/neobulks in 2007, but the share is projected to decline to four percent beyond 2020.

Table 4-6: Puget Sound Port Breakbulks/Neobulks
(1,000s of Metric Tons, Percent by Mode)

	Metric Tons (1,000s)					Percent by Mode			
	Rail	Truck	Barge/ Raft	Plant	Total	Rail	Truck	Barge/ Raft	Plant
Actual									
2002	491	2,901	144	0	3,536	14%	82%	4%	0%
2003	452	2,849	142	0	3,443	13%	83%	4%	0%
2004	475	2,779	134	0	3,388	14%	82%	4%	0%
2005	534	3,516	209	0	4,259	13%	83%	5%	0%
2006	580	3,196	187	0	3,963	15%	81%	5%	0%
2007	554	2,954	171	0	3,678	15%	80%	5%	0%
Forecast									
2010	545	2,938	166	0	3,649	15%	81%	5%	0%
2015	604	3,173	179	0	3,955	15%	80%	5%	0%
2020	671	3,312	185	0	4,168	16%	79%	4%	0%
2025	753	3,438	189	0	4,380	17%	78%	4%	0%
2030	846	3,562	194	0	4,602	18%	77%	4%	0%
Avg Annual Growth Rate									
2002-2007	2.4%	0.4%	3.5%	N/M	0.8%				
2007-2010	0.4%	-3.5%	-4.5%	N/M	-3.0%				
2010-2015	2.1%	1.5%	1.6%	N/M	1.6%				
2015-2020	2.2%	0.9%	0.6%	N/M	1.1%				
2020-2025	2.3%	0.7%	0.5%	N/M	1.0%				
2025-2030	2.4%	0.7%	0.5%	N/M	1.0%				
2007-2030	1.9%	0.8%	0.6%	N/M	1.0%				

Source: BST Associates

Dry Bulks (Including grains and other dry bulks)

Dry bulks handled on the Lower Columbia consist primarily of grain products, as well as some chemical and fertilizer products. As a rule of thumb, two-thirds of the wheat and barley is received by rail and one-third by barge in Lower Columbia Washington terminals. All of the grain products that originate in the Midwest move by rail.

For all dry bulks in all trades, in 2002 81 percent was handled by rail, 13 percent by barge, one percent by truck, and four percent direct to or from a plant. Over time, rail traffic is expected to grow slightly and barge traffic is expected to decline slightly because Midwest-produced grains are expected to grow more rapidly than regionally-produced wheat and barley.

Table 4-7: Lower Columbia Port Dry Bulks
(1,000s of Metric Tons, Percent by Mode)

	Metric Tons (1,000s)					Percent by Mode			
	Rail	Truck	Barge/ Raft	Plant	Total	Rail	Truck	Barge/ Raft	Plant
Actual									
2002	8,202	293	1,608	56	10,159	81%	3%	16%	1%
2003	8,867	208	1,899	214	11,188	79%	2%	17%	2%
2004	11,508	256	1,850	333	13,948	83%	2%	13%	2%
2005	10,882	297	1,551	537	13,267	82%	2%	12%	4%
2006	10,704	283	1,907	478	13,371	80%	2%	14%	4%
2007	12,702	233	2,089	567	15,591	81%	1%	13%	4%
Forecast									
2010	12,640	238	1,776	644	15,298	83%	2%	12%	4%
2015	13,157	253	1,788	661	15,859	83%	2%	11%	4%
2020	13,796	267	1,826	687	16,575	83%	2%	11%	4%
2025	14,361	276	1,876	707	17,221	83%	2%	11%	4%
2030	14,780	281	1,906	722	17,689	84%	2%	11%	4%
Avg Annual Growth Rate									
2002-2007	9.1%	-4.5%	5.4%	59.0%	8.9%				
2007-2010	3.0%	-4.3%	2.8%	3.7%	2.9%				
2010-2015	0.8%	1.2%	0.1%	0.5%	0.7%				
2015-2020	1.0%	1.1%	0.4%	0.8%	0.9%				
2020-2025	0.8%	0.7%	0.5%	0.6%	0.8%				
2025-2030	0.6%	0.4%	0.3%	0.4%	0.5%				
2007-2030	0.7%	0.8%	-0.4%	1.1%	0.6%				

Source: BST Associates

Puget Sound dry bulks include grain, cement, salt, gypsum, alumina, and other chemicals and ores. Rail accounts for 83 percent of the inland movements of dry bulks, with 16 percent handled by truck, one percent direct to or from a plant, and less than one percent by barge. All of the grain exported from Puget Sound is received by rail. Cement, salt, and gypsum are all received directly into plants.

The proportion of Puget Sound waterborne cargo transported inland via rail is projected to drop slightly between 2007 and 2030, while trucking is expected to increase slightly. The actual tonnage carried by rail, on the other hand, is expected to increase by approximately 18 percent, or from 18 million metric tons in 2007 to 21 million metric tons in 2030.

Table 4-8: Puget Sound Port Dry Bulks
(1,000s of Metric Tons, Percent by Mode)

	Metric Tons (1,000s)					Percent by Mode			
	Rail	Truck	Barge/ Raft	Plant	Total	Rail	Truck	Barge/ Raft	Plant
Actual									
2002	8,493	3,174	79	108	11,854	72%	27%	1%	1%
2003	11,103	2,742	83	169	14,097	79%	19%	1%	1%
2004	15,813	3,646	76	131	19,666	80%	19%	0%	1%
2005	17,309	3,450	87	150	20,995	82%	16%	0%	1%
2006	17,411	3,397	49	129	20,986	83%	16%	0%	1%
2007	18,070	3,408	81	217	21,777	83%	16%	0%	1%
Forecast									
2010	17,212	3,342	79	183	20,816	83%	16%	0%	1%
2015	17,716	3,727	86	185	21,714	82%	17%	0%	1%
2020	19,262	4,070	92	190	23,614	82%	17%	0%	1%
2025	20,458	4,351	97	193	25,099	82%	17%	0%	1%
2030	21,396	4,547	100	196	26,239	82%	17%	0%	1%
Avg Annual Growth Rate									
2002-2007	16.3%	1.4%	0.5%	15.0%	12.9%				
2007-2010	-0.1%	-0.6%	-1.9%	4.1%	-0.2%				
2010-2015	0.6%	2.2%	1.7%	0.2%	0.8%				
2015-2020	1.7%	1.8%	1.5%	0.5%	1.7%				
2020-2025	1.2%	1.3%	1.0%	0.4%	1.2%				
2025-2030	0.9%	0.9%	0.6%	0.3%	0.9%				
2007-2030	0.7%	1.3%	0.9%	-0.4%	0.8%				

Source: BST Associates

Liquid Bulks

The Lower Columbia ports in Washington do not handle chemicals and petroleum products. Most of the liquid bulk cargo is moved directly to or from a plant.

Table 4-9: Lower Columbia Liquid Bulk
(1,000s of Metric Tons, Percent by Mode)

	Metric Tons (1,000s)					Percent by Mode				
	Rail	Truck	Barge/ Raft	Plant	Total	Rail	Truck	Barge/ Raft	Plant	
Actual										
2002				527	527				100%	
2003				500	500				100%	
2004				282	282				100%	
2005				506	506				100%	
2006				373	373				100%	
2007				399	399				100%	
Forecast										
2010				412	412				100%	
2015				479	479				100%	
2020				557	557				100%	
2025				636	636				100%	
2030				720	720				100%	
Avg Annual Growth Rate										
2002-2007				-5.4%	-5.4%					
2007-2010				-4.0%	-4.0%					
2010-2015				3.1%	3.1%					
2015-2020				3.1%	3.1%					
2020-2025				2.7%	2.7%					
2025-2030				2.5%	2.5%					
2007-2030				2.6%	2.6%					

Source: BST Associates

In Puget Sound the liquid bulk category is dominated by crude oil from Alaska moving into refineries via water. Petroleum products are also shipped directly from the refineries, mostly by pipeline. There are also substantial volumes of liquid bulks moved to and from inland point by other modes though, including 501,000 tons by rail and 461,000 tons by truck. These other products include organic chemicals, animal oils and fats, and inorganic chemicals as well as refined petroleum products.

Movements directly to or from plants are projected to increase from 32 million tons in 2007 to 42 million tons in 2030. Rail and truck movements are each projected to grow slightly during the study period.

Table 4-10: Puget Sound Liquid Bulk Traffic
(1,000s of Metric Tons, Percent by Mode)

	Metric Tons (1,000s)					Percent by Mode			
	Rail	Truck	Barge/ Raft	Plant	Total	Rail	Truck	Barge/ Raft	Plant
Actual									
2002	663	398	192	30,309	31,563	2%	1%	1%	96%
2003	624	412	190	32,729	33,955	2%	1%	1%	96%
2004	602	498	243	33,156	34,498	2%	1%	1%	96%
2005	515	472	253	36,058	37,297	1%	1%	1%	97%
2006	491	462	264	34,888	36,105	1%	1%	1%	97%
2007	501	461	255	32,648	33,864	1%	1%	1%	96%
Forecast									
2010	501	449	249	36,077	37,276	1%	1%	1%	97%
2015	525	462	252	34,707	35,947	1%	1%	1%	97%
2020	551	475	255	28,709	29,990	2%	2%	1%	96%
2025	579	488	259	34,814	36,139	2%	1%	1%	96%
2030	608	501	262	41,508	42,880	1%	1%	1%	97%
Avg Annual Growth Rate									
2002-2007	-5.5%	2.9%	5.8%	1.5%	1.4%				
2007-2010	-0.5%	-1.0%	-0.3%	0.0%	0.0%				
2010-2015	0.9%	0.6%	0.3%	-0.8%	-0.7%				
2015-2020	1.0%	0.6%	0.2%	-3.7%	-3.6%				
2020-2025	1.0%	0.5%	0.2%	3.9%	3.8%				
2025-2030	1.0%	0.5%	0.3%	3.6%	3.5%				
2007-2030	0.8%	0.4%	0.1%	1.0%	1.0%				

Source: BST Associates

Modal Corridors

The following section presents a summary assessment of key trends and forecasts by mode/corridor. Due to its importance to Washington State ports, the central focus of this section is on rail corridors. However, this section also provides an assessment of short sea shipping alternatives and truck corridors.

The cargo projections contained in this study represent unconstrained forecasts of cargo opportunities. The projections assume that necessary support infrastructure will be in place at the time needed in order to take advantage of these opportunities. Inland transportation links, especially the rail system, were identified in the scope of work for this study as requiring special attention to determine if inadequate infrastructure would become a constraint to meeting future cargo opportunities.

Analysis of the adequacy of the inland transportation system is presented in the following three sections. The truck route system is examined first, followed by a detailed discussion of the rail system in Washington, and a discussion of short sea shipping opportunities is presented last.

Truck Corridors

Strategic truck corridors analyzed included I-5, I-90, I-82, SR-2, SR-12, SR-97 and SR-395. More specifically, I-5 included the entire route from the Canadian border to the Oregon border, I-90 included the entire route from the Idaho border to Seattle, and I-82 included the route from Ellensburg to the Oregon border. The section of SR-2 that serves as an important port-related freight corridor runs between Wenatchee and Everett. The portion of SR-97 that is considered a strategic port freight corridor is the Blewett Pass section, running from Wenatchee to I-90 at Cle Elum. Port-related traffic on SR-12 was estimated for two separate sections: SR-12W is that section between White Pass and I-5, and SR-12E is that portion from Walla Walla to Wallula. The focus on SR-395 includes the section between Spokane and the Tri-Cities.

Truck corridor distributions were estimated based on survey results from the Eastern Washington Intermodal Transportation Study (EWITS). In this survey, which consisted of interviews with nearly 4,000 truck drivers, the drivers were asked to provide details on roads taken on their current trip, as well as the commodity they were hauling. The first step in analyzing the truck corridors was to convert the commodities described in the interview results into ISIC commodity groups. Next the payload tonnage and number of trips were summarized for each of the strategic corridors, and a share calculated for each commodity group and corridor. These estimates were then converted into numbers of trucks.

For the Lower Columbia ports, I-5 is the main corridor used by waterborne freight transported by truck. The northern roads, SR-97, I-90, and SR-2, are not used at all, and a very small number of trucks travel on SR-101 or US12E at some point in their trip. It is estimated that in 2007 191,900 truck trips were generated on I-5 by Lower Columbia waterborne cargo, including both international and domestic waterborne traffic. The number of trucks is projected to increase to 244,300 trucks in the year 2030.

Table 4-11: Number of Loaded Trucks
Lower Columbia Truck Corridors
(1,000s of Loaded Trucks)

Year	I-5	I-90	I-82	SR-101	SR-2	SR-12E	SR-12W	SR-395	SR-97N
Above									
2002	203.2			0.5			3.0		
2003	199.0			0.3			2.8		
2004	208.0			0.1			2.8		
2005	194.5			0.1			2.6		
2006	198.1			0.1			2.4		
2007	191.9			0.1			2.1		
Forecast									
2010	200.0			0.1			2.2		
2015	214.9			0.1			2.4		
2020	227.9			0.2			2.4		
2025	238.2			0.2			2.3		
2030	244.3			0.2			2.4		

Source: BST Associates

With the exceptions of the ports of Grays Harbor and Port Angeles, all of the waterborne cargo generated by Puget Sound ports that is moved inland by truck travels on some portion of I-5. Much of the export cargo for Puget Sound ports is generated east of the mountains, and most of this traffic crosses the Cascades on I-90. There is also a small amount of cargo (primarily apples) that crosses the mountains on SR-2. The cargo originating in or destined for points east of the mountains is further divided into northern cargo (e.g., apples from the Okanogan area), southern cargo (e.g., apples from the Yakima area, frozen potatoes from the Tri-Cities area), and central cargo (e.g., hay from Ellensburg, frozen vegetables from Moses Lake). The northern cargo is typically shipped via SR-97 to I-90, the central cargo along I-90 only, and the southern cargo via I-82 and sometimes SR-12E to I-90. Port Angeles and Grays Harbor traffic travels mainly on SR-101.

It is estimated that the Puget Sound ports generated 936,000 full truckloads on I-5 in 2007. This is expected to increase to 1.8 million trips in 2030. Estimates of the number of loaded trucks using each of the strategic corridors is presented in Table 4-12. It should be noted that it is very common for a truck to be full in one direction, but not both directions. For example, a typical move would include taking an empty container from a port to Ellensburg for a load of hay returning back to a Puget Sound port.

Table 4-12: Number of Loaded Trucks
Puget Sound Truck Corridors
(1,000s of Loaded Trucks)

Year	I-5	I-90	I-82	SR-101	SR-2	SR-12E	SR-12W	SR-395	SR-97N
Actuals									
2002	682.3	141.7	64.2	82.4	2.6	6.9	10.8	2.2	11.2
2003	692.1	156.6	66.4	79.9	1.2	7.3	10.3	2.4	8.6
2004	806.6	164.5	76.5	90.5	1.4	8.5	11.2	2.9	9.9
2005	934.2	202.5	96.5	106.7	1.7	10.5	13.5	3.5	12.4
2006	965.7	247.5	114.8	109.5	2.1	12.5	13.9	4.1	14.7
2007	936.0	251.1	113.0	105.4	2.0	12.3	13.4	3.8	14.4
Forecast									
2010	963.9	232.0	101.3	98.3	1.9	11.0	11.6	3.6	12.7
2015	1,160.3	278.6	122.5	114.1	2.5	13.4	13.3	4.4	15.2
2020	1,375.4	332.8	144.3	130.8	3.3	15.9	15.0	5.2	17.9
2025	1,589.8	397.6	175.3	148.9	4.0	19.0	17.3	5.9	21.4
2030	1,832.3	463.4	204.7	171.7	4.7	22.0	20.1	6.8	24.9

Source: BST Associates

Rail Corridors

The ability of the rail system to handle projected volumes of port-related traffic is becoming a concern to the ports in Washington. As demonstrated above, a growing share of the cargo that moves through Washington ports moves to or from the docks by rail. Not only is the share moved by rail increasing, but this rail tonnage represents a growing share of a growing cargo base. At the same time, there is pressure to use existing rail capacity to support an increasing number of passenger trains on the same rail system that carries a high number of freight trains. Rail is examined in detail in the next chapter.

Short Sea Shipping

International trade in the U.S. that moves by water is projected to grow from 1.4 billion tons in 2008 to approximately 2.4 billion tons by 2038. "International trade is already a critical component of the U.S. economy. According to the OECD, the trade-to-GDP ratio for the U.S. increased from about 20.5 percent in 1990 to over 28 percent in 2006. The World Bank predicts that this ratio will rise to 35 percent by 2020, showing that trade will become an even more important component of the U.S. economy. Trade will not only grow in absolute terms, it will also increase as a share of GDP and thus as a contributor to growth in U.S. jobs and wealth. If current trends continue, imports and exports will comprise almost 55 percent of GDP by 2038. In other words, trade will grow twice as fast as the U.S. economy as a whole.[9]"

This increase will place significant stress on an already overloaded landside transportation system and nowhere is this stress more evident than at our major port gateways and coastal transportation corridors.

[9] Source: An Evaluation of Maritime Policy in Meeting the Commercial and Security Needs of the United States, January 7, 2009, by IHS Global Insight, Inc.

The Maritime Administration (MARAD) in partnership with public and private entities is exploring the development of a robust short sea shipping system to aid in the reduction of growing freight congestion on our Nation's rail and highway systems. Short sea shipping is fuel efficient, cost effective, and environmentally sound. The strategic objective of short sea shipping is to promote the use of the waterways as one method of easing traffic congestion and alleviating air pollution.

Historical Short Sea Activity in the Pacific Northwest

The Pacific Northwest has always enjoyed active barge and coastal freighter operations, handling domestic traffic (e.g., Puget Sound with Southern California, Snake River ports with ports on the Lower Columbia, Puget Sound ports with Alaska) and international traffic (e.g., waterborne trade connecting both Canada and Mexico with Puget Sound). This section briefly explores historical Pacific Northwest short sea shipping activity.

Imports and exports from Canada and Mexico primarily include bulk cargoes (chemicals, fertilizers, cement and sand and gravel, among other commodities) as well as substantial volumes of forest products (logs, wood chips and forest products). Limestone mined in Texada Island in Canada is shipped to the manufacturing plants in Seattle and Tacoma. Gypsum from Baja Mexico is shipped to wallboard plants in Seattle. Sand and gravel is received from quarries in British Columbia to meet the needs of the construction industry. Most of these products entail one-way movements by barge. However, general cargo movements by barge have been relatively limited to lumber, pulp and paper products.

Shuttle services have also operated in the region in the past, transporting containers between West Coast ports. As an example, Matson initiated a service in 1994 that connected British Columbia and key West Coast container ports. Coastal shuttle services by water and rail appeal primarily to two types of shippers. Domestic shippers have used the services to serve domestic markets and to access the more frequent ocean carrier service to Latin and South America. For example, these services have been used to transport lumber, apples and other products between the Pacific Northwest and Southern California. In addition, ocean carriers have used shuttles to transport empty and full containers from larger load center ports to smaller container ports. Prior coastal short sea operations were replaced with intermodal rail service on the BNSF.

Portland's Terminal 6 is the region's barging connection from inland producers to Pacific Rim markets and beyond. Container barging connects Terminal 6 to four shallow-draft upriver ports on the Columbia/Snake river system: Boardman and Umatilla, Oregon; Pasco, Washington; and Lewiston, Idaho. As indicated in chapter three, container barge service began on the Columbia/Snake River System in 1975. The barge volumes through Portland have reached levels as high as 50,000 containers per year.

Seattle serves as the center of barge trade between Puget Sound and Alaska. Several barge lines operate out of the Duwamish Waterway in Seattle, moving household goods, construction materials, food and other items to Alaska, and hauling fish and other products back to Seattle. These barge lines serve Southeast Alaska, the Aleutians, and more remote locations.

Potential for Short Sea Activity in the Pacific Northwest

The existing road and rail system along the West Coast is running into capacity problems. Waterborne transportation, where viable, should be considered as part of the overall solution to future freight and goods movement needs since it offers a clean, safe, efficient alternative. The potential benefits from short sea shipping include potential improvements to container terminal

productivity, reduction of truck trips and emissions, and reduction of rail conflicts at-grade crossings.

Short sea shipping can supplement the road and rail systems but this will require solutions to a variety of problems. Operational issues include facility improvements, use of public or private terminals, and restrictions due to domestic cabotage laws (Jones Act). Business issues include achieving a competitive delivered price, speed, reliability and flexibility of service.

The International Mobility and Trade Corridor (IMTC), which includes Transport Canada, MARAD and the Whatcom Council of Governments among others, undertook a study of short sea shipping as a means to help alleviate highway congestion and facilitate trade, improve utilization of waterway capacity and reduce greenhouse gas emissions. This study[10] found that while there are many short sea shipping services in the domestic, coastal trade on the West Coast of the U.S. and Canada, there are relatively few cross-border services. Existing cross-border services primarily haul bulk raw materials and semi-finished products from waterside production facilities. Study respondents also noted a large amount of existing carrying capacity on deep-sea vessels making West Coast port-rotations—from Vancouver to Los Angeles and points in between. But, high drayage and terminal charges are cited to explain low interest in using these carriers for coastal movements.

Factors affecting cross-border short sea shipping included customs regulations; security issues; port infrastructure and land availability; vessel infrastructure and technology. In particular, the operation procedures limitations and cost of service is a major factor impacting short sea viability. However, the study found that under certain conditions, short sea shipping was a viable alternative.

Conclusions

A number of the challenges to successful short sea shipping are operational and/or market-related and these may be addressed and/or ameliorated under certain circumstances. Costs are a major potential impediment to the introduction of new short sea shipping applications or the expansion of existing operations. Among these are service and user fees, excise taxes and the additional costs associated with seasonal operation. Financing may also be an issue for some proponents.

The Maritime Administration has initiated the Marine Highway Initiative (MHI) which provides incentives for and advocates for short sea shipping. This effort includes creating incentives for the emergence of a short sea shipping network. Short sea shipping can offer a viable, cost-effective and environmentally-friendly transportation option that complements the current and future movement of goods and passengers in almost all regions.

Short sea shipping will likely play a greater role in the future.

[10] Source: Cross Border Short sea Shipping Study Phase 1 and 2 Reports, by Cambridge Systematics for Transport Canada, 2004 and 2007

Chapter 5
Rail System Capacity

Introduction

The land transportation network continues to serve as the lifeline that links industrial plants, farms, and forests with cities and ports, and connects products with both local and distant markets. A large percentage of the Washington State economy is inextricably linked either directly or indirectly to offshore domestic commerce and international trade. As a result, the efficient performance of the highway, rail, and waterways systems are of critical importance for moving freight to and from the ports. The following chapter reviews the rail component of the inland transportation system.

This chapter contains several key sections, including:

- Overview of rail trends in Washington, with special emphasis on railroad investment trends, and on new issues facing railroads.
- Analysis of rail mainline capacity and its future expandability, accounting for international and domestic cargo, passenger/commuter, and other train types.
- Strategic issues at other major continental gateways, specifically British Columbia, Puget Sound, Lower Columbia, San Francisco Bay, and San Pedro Bay.
- Port access issues at Washington ports.

Overview

It is clear that the current state of the U.S. and worldwide economy has had a significant negative impact on business levels in the state of Washington. That impact is being felt by the state's ports and the inland transportation modes that serve them. Rail volumes have not been exempt from this circumstance, whether in Washington State or over the North American rail network.

As a result, train growth projections significantly different from those generated during the Washington Public Ports Association (WPPA) Rail Capacity Study—2004, the 2006 Statewide Rail Capacity and Systems Needs Study, and the Port of Tacoma's 2007 Off-Tideflats Study and Modeling. Numerous factors have resulted in train growth projections being shifted into the future. These include:

- Lower cargo volumes of all types.
- Longer train lengths.
- Different train routing scenarios.
- Lower passenger train forecasts.

Projected growth in train volumes is low for the mid-term for all train types, both freight and passenger. The uncertainty of rail freight demand for the short term is so significant that by early December the Marketing Department of the Burlington Northern Santa Fe Railway (BNSF) had not yet developed its resource demand forecast for 2009, a function normally completed by the beginning of the fourth quarter of the previous year. Indeed, BNSF Resource Planning personnel indicated that for all but international import/export containers, the best recommendation they

would suggest for calculating forward looking growth is to track U.S. Gross Domestic Product (GDP), which was negative in the second half of 2008.

Making the projection of rail freight demand more difficult is that the current economic circumstance is not just a U.S. phenomenon, but is being experienced worldwide, including in the Asian Rim, which is an important import/export partner with Washington ports.

If there is a silver lining in the current situation, it is that the recent declines in rail traffic have delayed capacity issues on certain routes in Washington State by a number of years. For example, the WPPA Rail Capacity Study – 2004 projected, based on freight growth projections at the time, that BNSF's Stevens Pass would exceed sustainable capacity in the 2009-2011 timeframe. The current study indicates that, due to the reduction in international container and domestic intermodal demand coupled with operational changes, the sustainable capacity on Stevens Pass won't likely be approached until 2018-2020 under either a low or moderate growth scenario.

It is clear from conversations with BNSF Resource Planning that passenger rail growth will continue to drive investments in capacity expansion in Washington for the foreseeable future, particularly on the I-5 corridor between Vancouver (Washington) and Tacoma.

BNSF's capacity investment plan for the state over the next five years does not include any significant expenditures, other than participation in siding extensions at Mount Vernon and Stanwood, and construction of a new customs inspection siding at Swift (Blaine) between Everett and the Canadian border.

In the meantime, competition from other ports on the West Coast of North America continues to grow. Ports in Southern California continue to attract a large portion of the West Coast international trade due to the huge local market they serve, and Oakland, while often considered less of a competitive threat, has continued to develop new properties as they have become available, and has seen growth in its international trade.

Of special importance for Washington ports, however, is competition from the Canadian ports of Vancouver and Prince Rupert; substantial investments are being made at both of these ports in order to improve their competitive positioning. Port Metro Vancouver (PMV), in particular, is developing ambitious plans for container facilities that could increase capacity by a factor of four over the next dozen years. The Port of Prince Rupert (PPR) also has ambitious plans to increase container throughput four-fold over the foreseeable future. It should be noted that PPR ended full year 2008 with nearly 182,000 TEUs handled, slightly over a year after the new facility opened.

Both PMV and PPR have and are receiving significant support from the federal and provincial governments for their efforts to expand and improve freight mobility. That support will potentially involve government investment exceeding $1 billion (Canadian) for projects currently identified and under consideration. In addition, at least in PMV's case, the ports have taken a proactive role in moving a variety of freight mobility projects forward.

The recent economic downturn has resulted in both Class I railways serving Washington (i.e. BNSF and Union Pacific Railroad "UP") to make slight reductions in planned 2009 capital expenditures, approximately $100 to $200 million for pure capacity expansion projects. The capacity expansion projects that remain are those for which previous commitments have been made including BNSF's intended improvements on the "Transcon" between Southern California and Chicago (Abo Canyon double-track) and UP intended double-tracking on the "Sunset Route" between Southern California and El Paso.

The positive side is that both BNSF and UP plan on continuing to invest in maintenance of existing track and purchase of locomotives, both of which are key components in maintaining capacity capability over existing track infrastructure. This capital investment with a view to the long term provides a good example of the path that Washington State should pursue in funding rail improvements, especially for those projects where the long-term interests of the state are clearly identifiable and the project timelines are long.

BNSF and UP Capital Investment Decisions and Strategies

Class I railroads normally spend approximately half of their annual budgets for maintenance of their physical network (e.g., rail, ties, ballast, bridges, etc.). With capital expenditures for UP and BNSF amounting to $3 billion per year over the last few years, a significant portion of both railways' capital expenditures has been for maintenance of existing track. Unto itself this represents a significant investment in capacity since deferred or reduced maintenance results in deteriorating track and lower throughput.

Similarly, BNSF and UP continue to make significant investments in locomotives. Trains that are under-powered often cannot maintain maximum allowable speed, consuming more capacity than trains that have sufficient power to maintain track speed. Both railways continue to purchase locomotives that are much cleaner in emissions and more fuel efficient than older generations of locomotives. In some instances local requirements for the use of "green" locomotives, such as in the Los Angeles Basin, have caused the railways to replace older locomotives. In addition to locomotives, capital expenditures for new or improved signal systems on existing networks also enhance the capacity of a segment of track.

Both BNSF and UP allocate 10 percent to 12 percent of annual capital spending to expansion of their physical networks. This normally amounts to capacity expansion expenditures between $200 and $300 million spread across their respective 30,000 plus mile systems, though this expenditure accelerated somewhat in the period from 2005 to 2007 with the emphasis of both railways in constructing double track on the single track segments for their respective mainline routes into and out of Southern California. For example, BNSF's project to construct the 3rd main track over Cajon Pass was a project that took four years to complete at a total cost of approximately $90 million. The new mainline is 16 miles long and is projected to increase total train capacity by 50 trains per day to approximately 150 trains per day.

In addition to physical capacity expansion projects such as constructing new main track, building new meet/pass sidings, and extending sidings, capacity expansion dollars are also used for expanding or constructing new yard and intermodal facilities. Consequently, competition for expansion capital is intense each year and the railroads normally focus those expenditures in locations they consider to be competitively sensitive.

Since their respective mergers, the preponderance of capacity expansion capital for BNSF and UP has been focused on their respective routes from the Pacific Southwest and the Midwest, and the coal routes in the Powder River Basin. BNSF has continued to invest in additional main track on its Transcon route with the goal to have double track on the entire route west of Avard, Oklahoma, with the previously mentioned Abo Canyon the last segment to be completed. While stretches of single track remain east of Avard, the ability to construct double track on that segment is relatively straightforward due to minimal geographical constraints. BNSF will continue to expand the capacity on the Transcon as traffic flows between the Pacific Southwest and both the Midwest and Southeast grow.

A significant reason BNSF will continue to focus track expansion capital predominantly on the Transcon has to do with the competitive threat UP has developed in the Pacific Southwest to Midwest and Southeast corridors through El Paso, Texas. As a result of its acquisition of Southern Pacific Railroad (SP), UP has developed a route to the Midwest that incorporates the Sunset Route between LA/Long Beach and El Paso, and between El Paso and Dallas/Fort Worth and Houston, the Golden State Route between El Paso and Kansas City, and multiple routing options between Kansas City and Chicago, including use of trackage rights on BNSF's Transcon. UP views its corridor as a competitive alternative to BNSF's Transcon.

With its success in increasing traffic in this corridor, as previously mentioned, UP has been facing significant capacity issues between LA/Long Beach and El Paso. This segment not only handles much of UP's international container train operations between the Pacific Southwest and Chicago, but is also the primary route for its traffic to and from the south and southeast U.S. UP's success is what has caused the extensive double track program between the LA Basin and El Paso, previously referenced. In addition, if UP continues to be successful in attracting traffic to the Pacific Southwest/Chicago corridor, capacity expansion demands between El Paso and Kansas City will grow.

Consequently, it is expected the two railroads will continue to focus the bulk of their mainline infrastructure capacity expansion capital on their respective routes between the Pacific Southwest and the Midwest. BNSF will spend capital to ensure that the Transcon remains the premier rail transportation route for the huge and growing volumes of intermodal traffic flowing between Chicago and LA/Long Beach. Similarly, UP will spend capital to continue to develop its route as a viable competitive alternative to the Transcon. The current downturn in rail traffic is allowing both railways to continue to focus on capacity expansion on this high-volume route with fewer interruptions to mainline trains.

Positive Train Control

Both the BNSF and the UP face a new capital expenditure requirement as a result of the recent Federal Railroad Administration (FRA) and Congressional decision that mandates that Positive Train Control (PTC) be implemented on all mainline corridors that carry both freight and passenger trains. The legislation, passed in the wake of a head-on collision in California between a UP freight train and a Metrolink commuter train, requires the installation of PTC by the end of 2015. The legislation also requires that PTC be installed on all routes that handle certain hazardous materials. As a practical matter, this means that the U.S. freight railways will be required to install PTC on virtually all mainline corridors.

Nationwide, it has been estimated that implementation of PTC could cost anywhere from $3 billion to $8 billion. The major U.S. railroads, including BNSF, UP, CSX Corporation (CSX), Norfolk Southern (NS), and Kansas City Southern (KCS) have been in various stages of testing PTC for a number of years. One of the significant issues the railroads have been dealing with is inter-operability, or the ability of the PTC systems of each railroad to communicate with another railroad's system when locomotives are operating on another railroad. As a result of the recent legislation, the railroads have initiated an effort to develop a system that will work across all of the railroads.

Railroad testing of PTC has been progressing for quite a few years. BNSF tested a system in the early-mid 1990s in Minnesota and has been an early leader in the technology's development. With the new requirement of implementation of PTC by end of 2015, the railroads are accelerating

their efforts. UP, for example, has begun testing its PTC system in Washington, Idaho, Nebraska, Iowa, and Wyoming, and has indicated that it may implement PTC in the Los Angeles Basin by 2012. BNSF had also indicated plans to implement PTC in the Los Angeles Basin area by 2012, but the recent requirement to develop the inter-operability capability may delay that target. The need for inter-operability may also delay implementation for the UP.

In addition to the freight railroad requirements, passenger rail will also have to install the GPS communication equipment on locomotives where passenger and commuter trains operate jointly with freight operations. In the state of Washington this will impact all of BNSF's mainline routes since Amtrak and Sound Transit currently operate on the I-5 corridor between Portland and the Canadian border. Amtrak also operates between Sand Point, Idaho and Everett via Stevens Pass, and Spokane and Vancouver/Portland via the Gorge Route. The only BNSF mainline corridor not affected by passenger operations is the Stampede Pass route between Pasco and Auburn. The hazardous materials provision, however, may require BNSF to implement PTC over Stampede Pass.

The question of where the money will come from to finance the implementation of PTC has not been fully answered. Legislation provides each railroad $50 million per year for five years, but that financing is not expected to come anywhere close to the total capital expenditures that will be required to meet implementation by 2015. UP, for example, has projected that it will spend up to $1 billion dollars to implement PTC by 2015.

Implementation of PTC is likely to drain capital from other capacity improvement projects over the next five to seven years. This will result in even greater competition for the remaining monies available for capacity improvement investments. In recent years the focus of capital infrastructure investment by both the BNSF and UP has not been on their systems serving the Pacific Northwest. Because of the PTC requirement, money for infrastructure improvements in Washington will be difficult to attain, especially on the BNSF system.

On the other hand, PTC offers the potential to increase rail capacity in the state without constructing new track. PTC offers the potential to be far more than a "safety" program.

PTC would in essence augment or replace the existing signal systems that control the spacing and movement of trains. Train movements on most of the heaviest tonnage mainline freight corridors are controlled by a Centralized Traffic Control (CTC) signal system. CTC authorizes and controls train movements (spacing, speed, mainline occupancy, etc.) through signals that are spaced some distance apart, generally between two and five miles, depending on the territory. Signal spacing within larger terminal areas may be closer together, particularly in areas with multiple yards, terminals, access and egress points, remote controlled crossovers, and rail interlockings.

PTC would not replace the entire CTC signal infrastructure, as signals at "control points" such that mainline crossovers, interlockings, and access/egress points would remain. What PTC could allow, however, is the more efficient use of track distance between control points without regard to existing intermediate signals. PTC would provide train dispatchers a "real-time" view of where every train is and speed at which it is operating. This ability would enhance track use efficiency in that:

- Dispatchers could make more timely and efficient decisions on how and where to set up meet/pass situations.
- PTC would allow a following train to operate in closer proximity to a leading train in the same direction, improving track capacity utilization.

- PTC technology would take over and cause a train to be stopped if it was about to violate the safety zone of leading or opposing trains, or the maximum authorized speed for a section of track.
- By having a real-time view of each train's location and operating parameter, dispatchers can make better decisions on the timing of trains into terminal areas, so that an arriving train is less likely to be "held-out" pending arrival track availability.

A study performed for the FRA in 2004 indicated that PTC would result in significant business benefits for railroads and shippers by increasing train velocity, operating reliability, and capacity/equipment utilization. The impact in Washington State from implementation of PTC is not known. It is possible, however, that both rail line capacity and train speeds could increase, without the construction of physical infrastructure.

Current and Future Rail Mainline Capacity

The following section of this chapter presents analyses of the capacity of the mainline rail segments in Washington along with their projected use. First, however, it is appropriate to recap the pertinent current train operating and planning information that has been provided by BNSF for this study. It should be noted that the train size discussion is from BNSF comments, but UP train sizes would likely correspond closely to those of the BNSF.

As previously mentioned, BNSF Marketing, had a difficult time by late 2008, in forecasting 2009 traffic levels due to the rapid change in transportation demand. Within Washington, BNSF expects that domestic intermodal and manifest traffic will be down from 2008, grain volumes will be flat, and coal will be up slightly. Therefore, the expectation is that overall train numbers will be down since intermodal and manifest make up a larger percentage of train volumes than do grain and coal. International container volumes are expected to follow port projections.

Given the difficulty in forecasting for 2009, BNSF has not yet looked beyond 2009 for a 5-year growth projection. According to BNSF planning personnel, the best estimate is to track domestic growth with Inland Point Intermodal (IPI) or Gross Domestic Product (GDP). Capacity demand will track with changing volumes, train sizes, and operating logistics. Grain—driven by harvest production, internal production demand, inland competition from the Mississippi River/Gulf export gateway, and international demand—will be subject to swings in export volumes through the Pacific Northwest (PNW) ports.

BNSF unit grain sizes will remain at approximately 110 cars into the foreseeable future because inland loading facilities have been constructed for those train sizes. Unit coal trains to Centralia will remain at 115 to 120 cars based on the most efficient locomotive configurations between the Powder River Basin and the PNW. Container trains of 8,000 feet from the Puget Sound Ports will continue so long as available volumes allow, while maintaining service requirements for available traffic. Otherwise, international container trains will be sized to meet import demand and service requirements. Insufficient volumes are currently available to operate many 8,000-foot domestic intermodal trains. Manifest trains will continue to operate at a maximum train size of approximately 7,000 feet throughout the state, although they are averaging 5,800 feet per train, given current traffic volume.

For the BNSF, enough capacity exists on currently operated trains to absorb a significant volume of traffic before additional train starts are needed, within the limits of service requirements. The same likely holds true for the UP.

Given the uncertainties of growth over a 20-year time frame under the current economic environment, Mainline Management (MLM) created a high case (based upon 2004 volumes), low growth, and moderate growth perspective to use in the following segment analyses.

The comparative growth rates used in this analysis were:

WPPA Rail Capacity Study—2004:

- Merchandise/Bulk: 2%
- Domestic Intermodal/Auto: 4%
- Int'l Container: 8%

2008 Low Growth Scenario:

- Merchandise/Bulk: 1.5%
- Domestic Intermodal/Auto: 2.5%
- Int'l Container: 3%

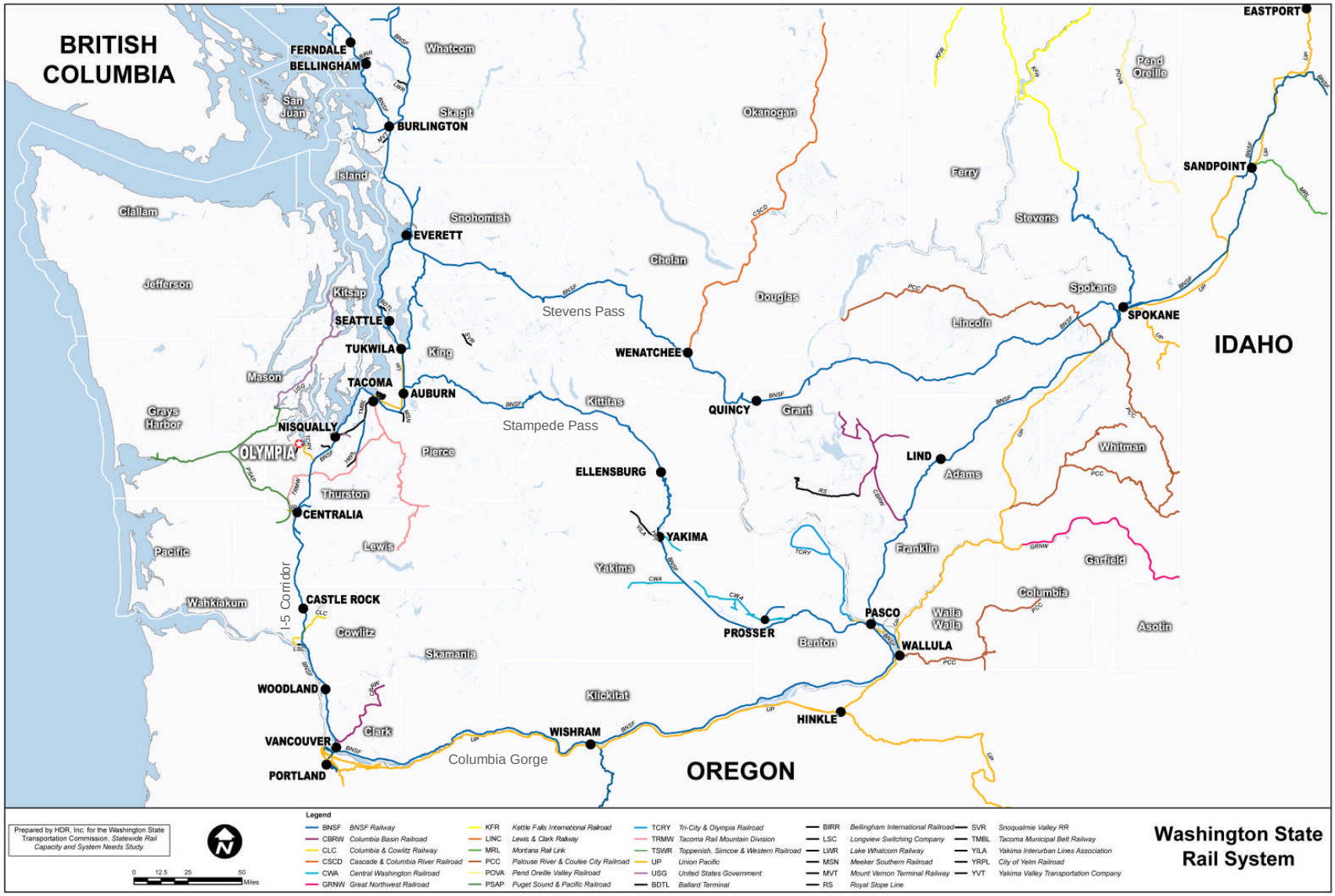
2008 Moderate Growth Scenario:

- Merchandise/Bulk: 2%
- Domestic Intermodal/Auto: 3.5%
- Int'l Container: 4.5%

Line segments analyzed (as shown in Figure 5-1):

- Vancouver, WA to Pasco BNSF
- Wallula to Spokane UP
- Pasco to Spokane BNSF
- Spokane to Sand Point, Idaho
- Vancouver, WA to Kalama/Longview
- Kalama/Longview to Tacoma
- Tacoma to Seattle (King Street Station)
- Seattle (King Street Station) to Everett
- Everett to Vancouver, BC
- Everett to Spokane
- Everett to Spokane (Stevens Pass)
- Auburn to Pasco (Stampede Pass)

Figure 5-1: Major Rail Corridors in Washington



Source: WSDOT

Vancouver, WA to Pasco BNSF

BNSF has no current plans in its 5-year capital expenditure plans to increase capacity on this route. All meet/pass sidings between Vancouver and Wishram (near the middle of the Columbia Gorge) are at least 8,000 feet in length. Between Wishram and Pasco six of 11 existing sidings are 8,000 feet in length or longer, and BNSF has a priority plan to extend sidings that are not currently 8,000 feet in length as demand requires.

It is likely that sustained capacity on this route can be enhanced through a combination of siding extensions, PTC implementation, and expansion of use of Stampede Pass. These improvements would increase capacity beyond that assumed in prior studies.

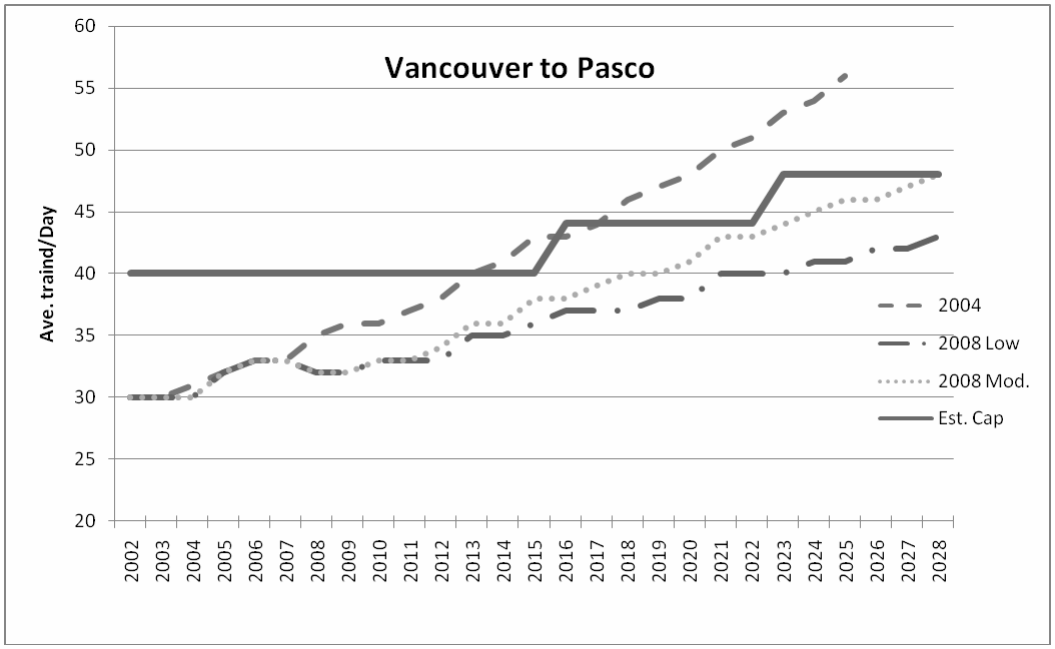
This route, since it hosts an Amtrak movement to Portland, is subject to implementation of PTC over the route between Spokane and Vancouver (indeed between Sand Point, Idaho and Vancouver). Since most of this corridor involves non-terminal operations with relatively evenly spaced sidings and regular control points, PTC train operating control could have a positive impact on current and potential throughput capacity.

The siding extensions that BNSF has already prioritized will close the gaps between sidings that can accommodate 8,000-foot trains between Wishram and Pasco.

Finally, should the mid-train helper test for bulk trains prove to be productive, BNSF will have the ability to allocate additional trains to Stampede Pass that would otherwise operate via the Gorge Route between Pasco and Vancouver. While not all loaded unit bulk trains would be productive via Stampede Pass (Portland/Vancouver bulk trains for example), should the Stampede Pass test prove worthwhile, BNSF will have an additional discretionary routing opportunity to maximize existing available capacity on the Gorge Route.

Figure 5-2 illustrates the capacity of this line segment and projected train volumes.

Figure 5-2: Rail Corridor Capacity – Vancouver to Pasco BNSF



Source: Mainline Management

Wallula to Spokane UP

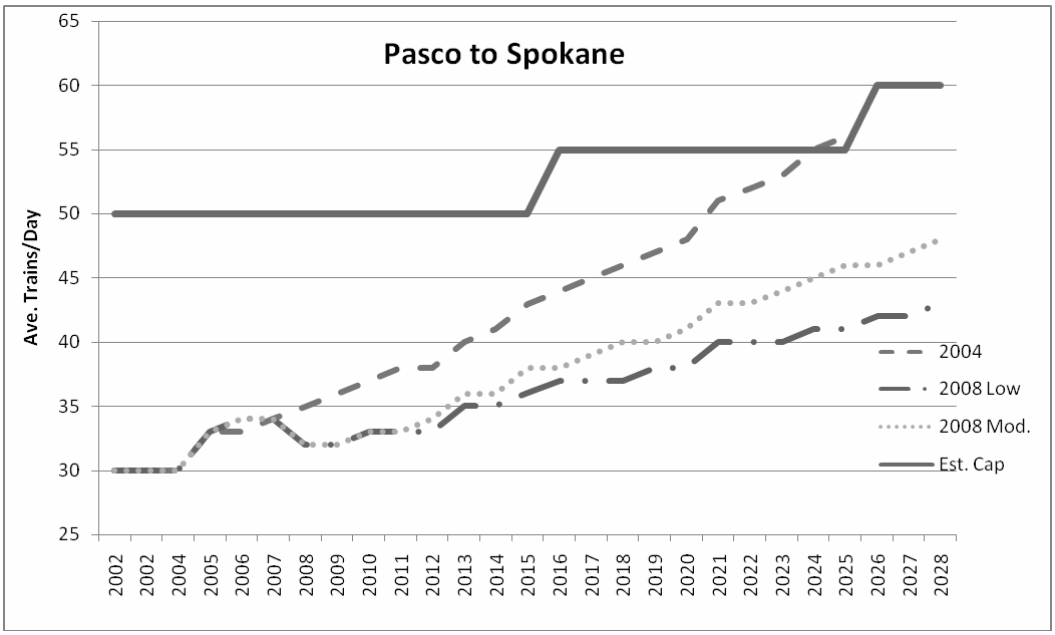
UP has a secondary mainline that extends from Wallula in Southeast Washington through Spokane to a connection with Canadian Pacific Railway at Eastgate, Idaho. The UP line is restricted by the distance between sidings on the section between Wallula and Spokane, coupled with the route being primarily Automatic Block Signal System controlled with manual switches at sidings. Neither the WPPA Rail Capacity Study—2004 nor the 2006 Statewide Rail Capacity and Systems Needs Study closely analyzed the UP between Wallula and Eastgate, other than a relatively high level discussion of available capacity and assumptions of current demand. Consequently, no comparative analysis for the 2008 analysis is available for graphic comparison.

Pasco to Spokane BNSF

Between Pasco and Spokane all sidings are 8,000 feet in length or longer, and BNSF believes that capacity exists to operate several more trains in each direction on the segment. Additional capacity may be possible by linking existing sidings together into double track segments, but the BNSF has not yet initiated design work for siding extensions.

The 2004 and 2006 studies, based on the traffic levels prevalent at the time of those analyses and growth projections, estimated that maximum sustainable capacity would be reached before 2025. (See Figure 5-3.)

Figure 5-3: Rail Corridor Capacity – Pasco to Spokane BNSF



Source: Mainline Management

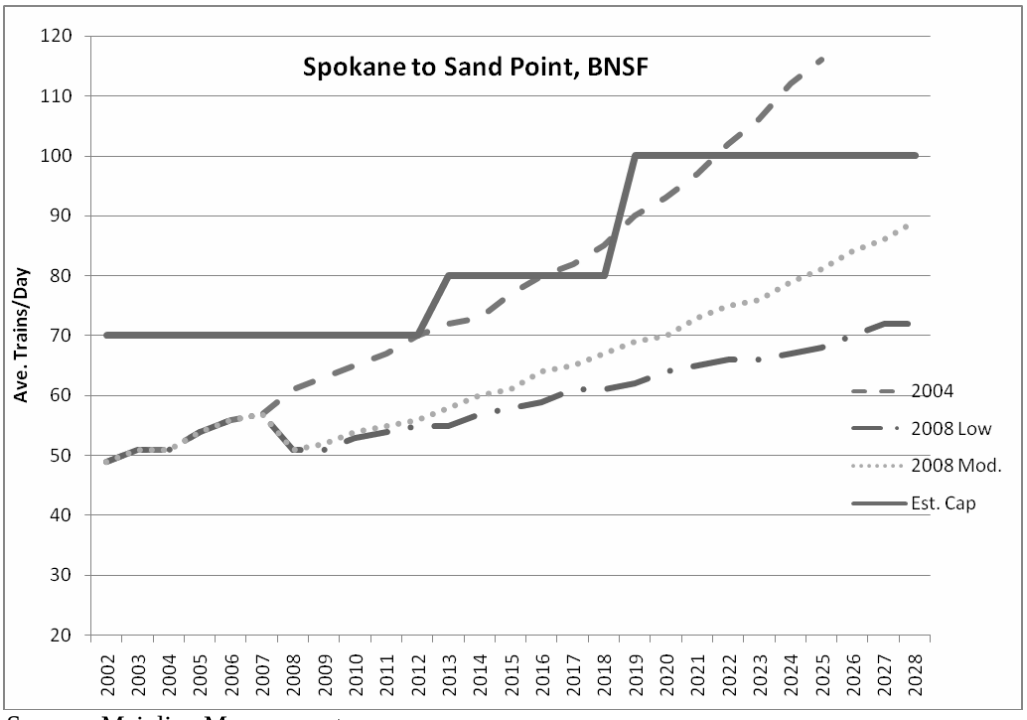
Spokane to Sand Point, Idaho

There are two mainline segments between Spokane and Sand Point, Idaho, one operated by the BNSF and one by the UP. Each of these routes is approximately 65 to 70 miles in length.

The BNSF mainline primarily features double track, with one short stretch of single track between Rathdrum, Idaho and Athol, Idaho. BNSF believes it has the ability to add several more trains per day to their route before capacity demand would become an ongoing issue. When that contingency occurs, BNSF will likely have several options for increasing capacity to meet demand, including double-tracking the remaining single track segment between Spokane and Athol, although that section presents certain difficulties and enhanced costs. In addition, BNSF could link strategic sidings into sections of double track to enhance throughput capacity. In the interim, the segment appears to have sufficient capacity for the foreseeable future.

Current capacity on the UP segment from Spokane to Sand Point is approximately 12 to 14 trains per day, with current demand of approximately eight to ten trains per day. The current economic downturn has likely afforded UP the opportunity to maximize train sizes, in turn slightly reducing train volumes. (See Figure 5-4.)

Figure 5-4: Rail Corridor Capacity – Spokane to Sand Point BNSF



Source: Mainline Management

A series of rail and road improvements, jointly referred to as the "Bridging the Valley" project, have been planned between Spokane, Washington and Athol, Idaho to separate vehicle traffic from train traffic. Where there are currently 75 railroad/roadway crossings this project will construct approximately 19 grade-separated crossings within the BNSF corridor. The UP Pacific mainline will be relocated to an alignment within BNSF's mainline corridor, eliminating all mainline at-grade crossings on the UP line, and rail capacity will be increased by adding additional mainline track on the BNSF corridor between Spokane and Athol. However, the BNSF has indicated that

capacity on this segment is sufficient, and the railroad currently sees no value in participating in the project.

I-5 Corridor

Plans to increase volumes of intercity passenger rail have driven the infrastructure expansion proposals for this segment. It generally can be divided into two sections: Vancouver to Longview and Longview to Tacoma.

The most significant capacity usage on this route is between Kalama and Longview area. The first area of concern relates to grain trains leaving or entering the mainlines at Kalama. The second involves the mainline operations working the yard areas at Longview Junction. In both cases, considerable mainline capacity is consumed by trains stopped to work in yard areas or slowly entering or departing the mainlines from export grain facilities.

BNSF has no plans, other than those proposed to support intercity passenger train volumes, to increase capacity over the route. From a freight perspective, BNSF believes sufficient capacity exists for the foreseeable future. Indeed, BNSF Planning sees nothing in this corridor as "freight driven". BNSF indicated it will construct additional capacity in the corridor only as driven by growth in passenger train volumes (this also applies to the segments between Tacoma and Seattle, and between Seattle and Everett).

Over the long term there are areas of conflict that will need to be addressed in order to support increased freight and passenger operations. The implementation of PTC may help somewhat, but additional trackage will be required in order to handle the projected numbers of trains. In particular, the stretch between Kalama and Longview will need additional new mainline trackage in order to support increased intercity passenger operations with projected freight operations.

The updated Amtrak *Cascades* Mid-Range Plan focuses on this area for improvements in early phases. The early improvement phases for the current program (setting aside the Pt. Defiance Bypass plan) focus on improvements in the Kalama/Longview area (essentially a third main track that bypasses existing congestion points). Improving mainline train operations through this area will be fundamental to allowing increased numbers of passenger trains on the freight rail corridor. The following discussion focuses on the two primary parts of this segment: Vancouver, WA to Kalama/Longview and Kalama/Longview to Tacoma.

Vancouver, WA to Longview

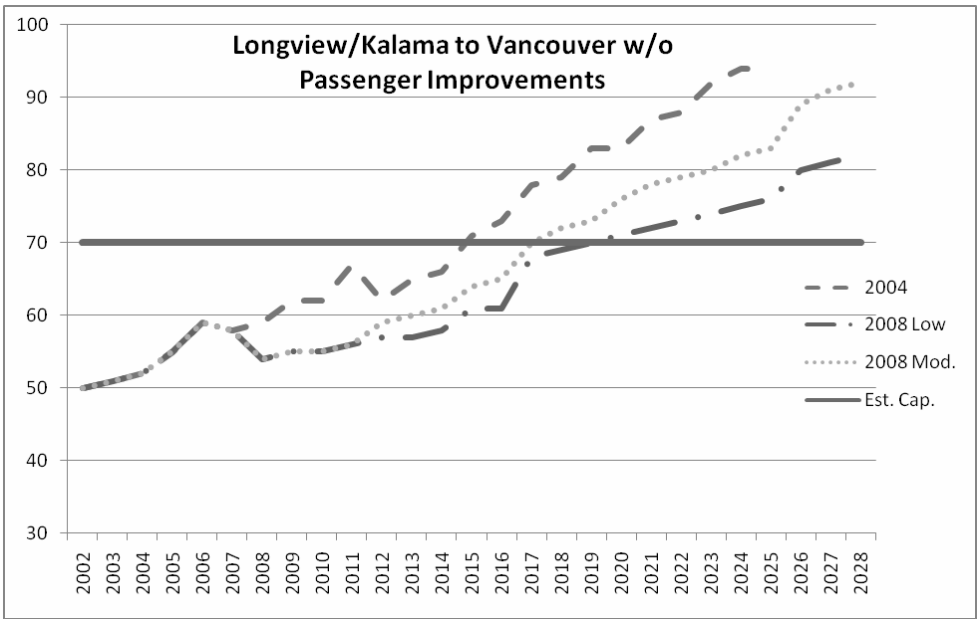
Much of the congestion on the I-5 corridor occurs between Vancouver and Longview. Terminal operations, combined with multiple mainline routes intersecting at Vancouver, and the current access/egress conflicts to the Port of Vancouver, combine to create ongoing operational conflicts. Additional intercity passenger train operations will aggravate those conflicts into the future unless sufficient mitigation is constructed to improve efficiency for all train operations in the Vancouver Terminal area.

In addition, trains that arrive or depart the mainline in the area between Kalama and Longview further aggravate the congestion issues on this segment (grain at Kalama, merchandise at Longview). The following two graphs clearly demonstrate the impact of those conflicts with and without the proposed capacity improvement over this portion of the Vancouver to Kelso segment.

As illustrated in Figure 5-5 and 5-6, passenger and freight growth over this segment is projected to exceed capacity within ten years unless improvements are constructed. In reality, however, BNSF will not allow the increase in passenger train operations until those improvements

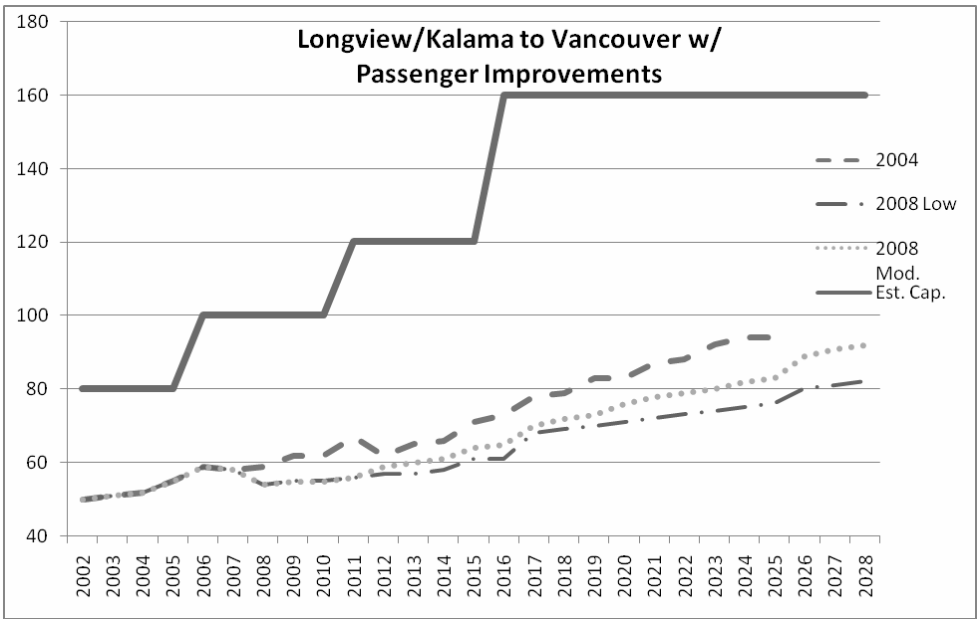
are in place. Figure 5-6 indicates that Amtrak *Cascades* Mid-Range Plan, Options 3 and 4, will provide the rail capacity needed to ensure that intercity passenger growth can occur in conjunction with projected freight growth, even with a more robust freight volume recovery than the current economic environment would suggest.

Figure 5-5: Rail Corridor Capacity – Vancouver, WA to Kalama/Longview Without Passenger Improvements



Source: Mainline Management

Figure 5-6: Rail Corridor Capacity – Vancouver, WA to Kalama/Longview With Passenger Improvements



Source: Mainline Management

Without the Option 3 level of improvements included in the Amtrak *Cascades* Mid-Range Plan, it is unlikely that BNSF will allow an increase in intercity passenger trains on this segment, and the graphs illustrate the reason for this.

Construction of a third main track between Kalama and Longview will offer the additional mainline throughput that will be needed in the long term, regardless of what operating efficiencies PTC may offer this area. PTC will not mitigate the impact that trains slowing, stopping, accessing or leaving, picking up, or setting out using a main track has on throughput capacity.

This finding of this analysis does not differ substantially from the between the WPPA Rail Capacity Study—2004 or the 2006 Statewide Rail Capacity and System Needs Study.

Longview to Tacoma

Similar to the Vancouver, WA to Longview segment, this part of the network experiences capacity conflicts. The primary capacity limiting points are the single track Nelson-Bennett and Ruston tunnels between Nisqually and Tacoma, but several other constraints exist as well. A number of projects are planned to alleviate capacity problems on this route.

One of the major plans is to construct the Point Defiance Bypass. This project reroutes passenger trains from the BNSF mainline to the existing rail line that parallels I-5 from Nisqually through DuPont, Lakewood, and South Tacoma, rejoining the mainline in downtown Tacoma. Passenger trains would be re-routed to this line, while most freight trains would continue to use the existing mainline.

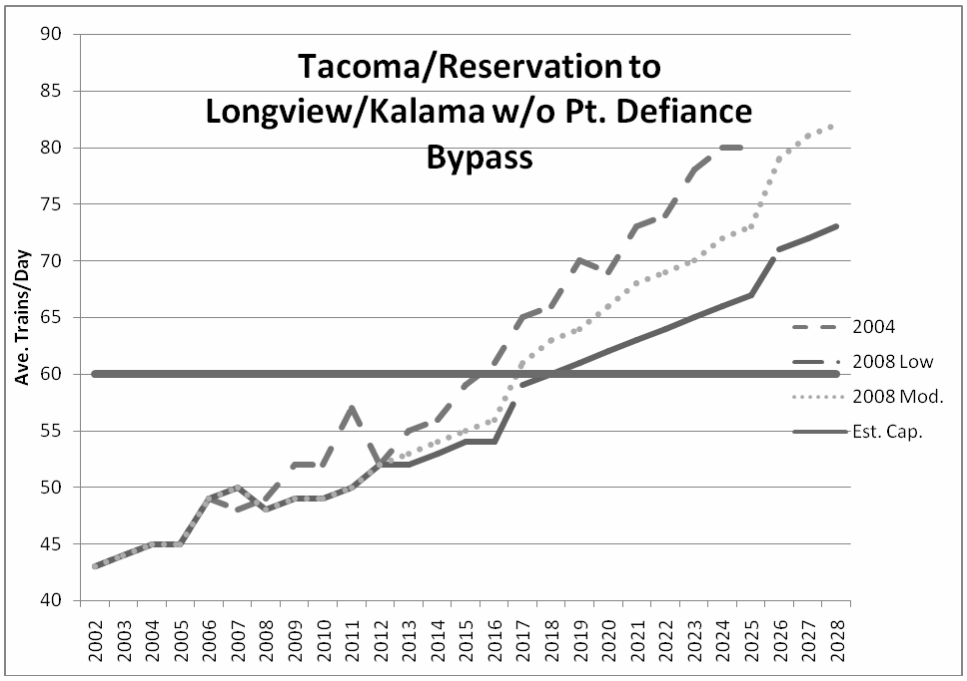
Another set of improvements along this segment is centered in and near Centralia, the so-called Tacoma Rail and Puget Sound & Pacific Railroad (PSAP) plan. The PSAP line to Hoquiam interchanges with the BNSF mainline at Centralia, and also crosses the Tacoma Rail at Blakeslee Junction in Centralia. Under the initial phases of this plan the BNSF-PSAP interchange would be re-aligned, and a connection built between Tacoma Rail and PSAP. Later phases would add a second Tacoma Rail-PSAP connection, additional mainline at Centralia, and other improvements.

Installation of several new high-speed crossovers will also increase capacity on this segment by allowing faster passenger trains to pass slower freight trains. Three crossovers are planned, at the Newaukum River, Chehalis Junction, and Tenino. The Newaukum and Chehalis Junction projects are planned for 2014, while the Tenino crossover is under construction and planned for completion in mid-2009.

As illustrated in Figures 5-7 and 5-8, without the necessary improvements on this segment, the available capacity on the segment will be exceeded by about 2018, at even the lowest freight recovery scenario. Consequently, it should be expected that BNSF will not allow growth in passenger operations without a clearly defined set of capacity improvements that protects freight performance regardless of how the economy recovers over the next few years.

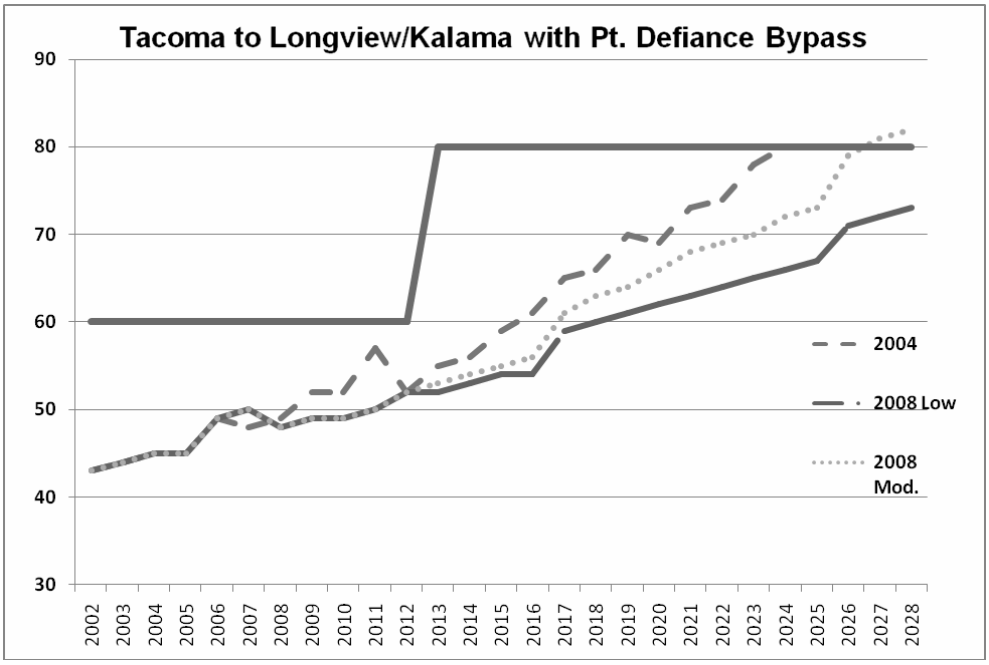
As mentioned above, PTC may play an important role in determining the capacity requirements for these two segments into the future. However, regardless of the potential capacity improvements resulting from PTC, physical capacity improvement projects are necessary in order to meet long-term growth expectations. These projects involve significant capital expenditure. However, because of the significant expansion in capacity that each of these projects creates on the busiest corridor in the state, they represent the most important rail capacity improvement items in Washington. Rail capacity modeling has demonstrated that these projects represent the greatest impact on mainline capacity in the state.

Figure 5-7: Rail Corridor Capacity – Kalama/Longview to Tacoma Without Point Defiance Bypass



Source: Mainline Management

Figure 5-8: Rail Corridor Capacity – Kalama/Longview to Tacoma With Point Defiance Bypass



Source: Mainline Management

Tacoma to Seattle (King Street Station)

Between Tacoma and Seattle a number of improvements have been made in recent years to accommodate Sound Transit rail service. These improvements have created an efficient operating environment that effectively serves both freight and passenger operations. Sound Transit has expressed satisfaction with the level of service provided by BNSF, and is not aware of any conflicts with BNSF freight operations.

Both the WPPA Rail Capacity Study – 2004 and the 2006 Statewide Rail Capacity and Systems Needs Study indicated that the projected growth over the BNSF and UP segments of this corridor was well compensated by the infrastructure improvement plans previously agreed upon. Both studies projected that 2025 train volumes on this segment would be at levels below 100 percent of sustainable capacity with the completed and planned improvements for passenger rail. In addition, the recent agreement between Port of Tacoma and UP to shift UP domestic intermodal traffic from Seattle to the Port of Tacoma's South Intermodal Facility should result in fewer UP trains operating between Seattle and Tacoma, at least in the short term.

The longer term plan of Sound Transit and Washington State Department of Transportation (WSDOT) to implement passenger services between Tacoma Freight House Square, Lakeside, and Nisqually (the Point Defiance Bypass) will further improve freight and traffic flows through Tacoma, and between Tacoma and Seattle. Significant work has yet to be completed to make the Pt. Defiance Bypass a reality. However, there is a target date of 2012 for completion, well in advance of PTC implementation on the I-5 corridor.

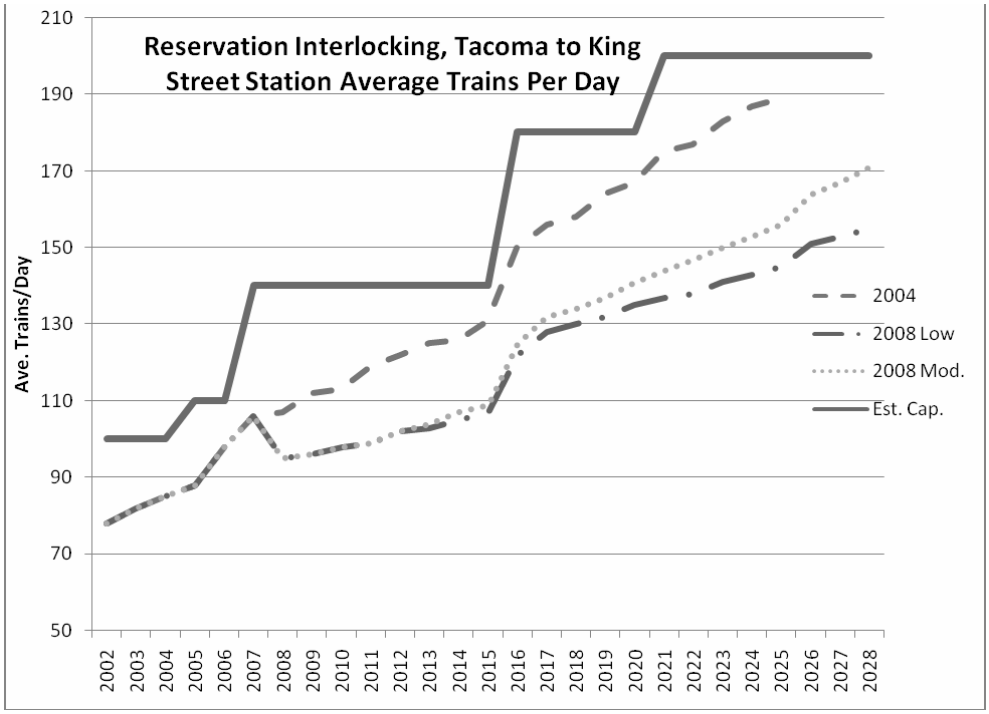
With the limited distance between Tacoma and Seattle, PTC is unlikely to increase capacity. What PTC is likely to do, however, is to enhance the flow of trains entering and exiting the mainline, thereby contributing to more efficient use of existing infrastructure.

The ongoing improvements at King Street Station in Seattle have also contributed to more efficient combined freight and passenger operations between the Seattle Tunnel and Argo Interlocking. As with the Vancouver to Tacoma segment of the I-5 corridor, BNSF has no capacity expansion plans in its 5-year capital investment plan for this segment beyond that being driven by increases in intercity and commuter passenger growth plans.

It should be noted that Sound Transit and BNSF are currently in discussions to update the operating and volume agreement between Tacoma and King Street Station in Seattle. These discussions are focusing on an agreement similar to the one now in place between King Street Station and Everett. Under this scenario, Sound Transit would purchase additional train slots rather than paying for specific physical improvements. Assuming that this arrangement would ultimately result in 15 round-trip commuter trains per day between Seattle and Tacoma, it appears to be acceptable to Sound Transit. In return, BNSF would be expected to construct the capacity improvements necessary to ensure that passenger and freight movements continue to operate efficiently.

Figure 5-9 portrays demand and capacity on this segment with the expected set of capacity improvements that the Phase 3 Agreement anticipated. Actual physical improvements and accompanying capacity, assuming an agreement between BNSF and Sound Transit along the lines of the north end agreement, will depend of BNSF determinations. As the figure indicates, sufficient capacity for all trains was projected over the foreseeable horizon with the improvements that Phase 2 and 3 of the original Sound Transit capacity improvement plan anticipated. The available capacity and demand profiles are not expected to change dramatically under a new Sound Transit—BNSF agreement.

Figure 5-9: Rail Corridor Capacity – Tacoma to King Street Station



Source: Mainline Management

Seattle (King Street Station) to Everett

As with the Vancouver, WA to Seattle segments of the I-5 corridor, BNSF construction of capacity expansion infrastructure is being driven by specific passenger growth plans. BNSF does not have any freight driven capacity expansion plans for this segment in its current 5-year capital expenditure plan.

Both the WPPA Rail Capacity Study – 2004 and the 2006 Statewide Rail Capacity and Systems Needs Study projected that the capacity improvements proposed to support Sound Transit commuter operations would provide sufficient sustainable capacity to handle 2025 train volume projects. Both studies projected that as daily capacity demand on Stevens Pass reached daily sustainable capacity, overflow BNSF trains would be rerouted to or from Puget Sound, either via Stampede Pass or the I-5 corridor to Vancouver and the Gorge Route. The proposed Sound Transit improvements, coupled with train operating profile changes, would continue to provide sufficient capacity as growth occurs.

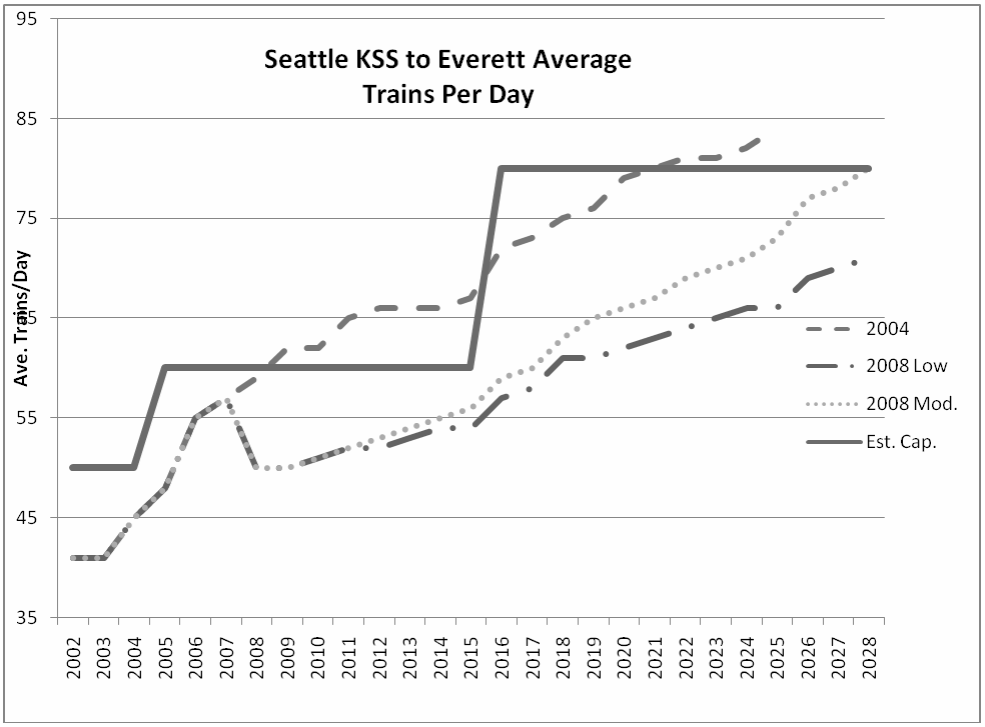
Sound Transit purchased "slots" for commuter operation over this portion of the I-5 route. No specific passenger train volumes were tied to capacity improvements, rather BNSF guaranteed passenger volumes and service levels by agreement. It has been left to BNSF to ensure that those passenger requirements were met, regardless of freight demand.

BNSF has made some improvements to the segment, including the Galer Street improvements, double-tracking of the Ballard single-track segment, and engineering for the double-tracking in the Edmonds area. Figure 5-10 demonstrates the capacity expansion capabilities of BNSF on this segment and the projected demand over time. As noted, however, given the capacity limitations of Stevens Pass and the uncertainty of freight train volumes to Canada over time, the volume demand may be overstated but errs on the conservative side.

The estimated increases in capacity illustrated in Figure 5-10 reflect targeted improvements. However, actual capacity increases will depend on what the physical improvements BNSF determines are necessary to provide for continued freight and passenger efficiency.

Implementation of PTC on this segment of the I-5 corridor is unlikely to significantly improve capacity, because the segment is relatively short and the existing multiple control points are likely to remain. Some improvement to traffic flow may result, but would probably be limited enough that a significant increase in sustainable capacity is unlikely.

Figure 5-10: Rail Corridor Capacity – King Street Station to Everett



Source: Mainline Management

Everett to Vancouver, BC

BNSF's 5-year capital plan for this segment of the I-5 corridor does involve capacity improvements which also have intercity passenger ramifications. The following capacity improvement projects are in the engineering stage:

- Siding upgrade and extension at Stanwood.
- Siding upgrade and extension at Mount Vernon.
- Construction of a new siding at the Swift Customs Facility.

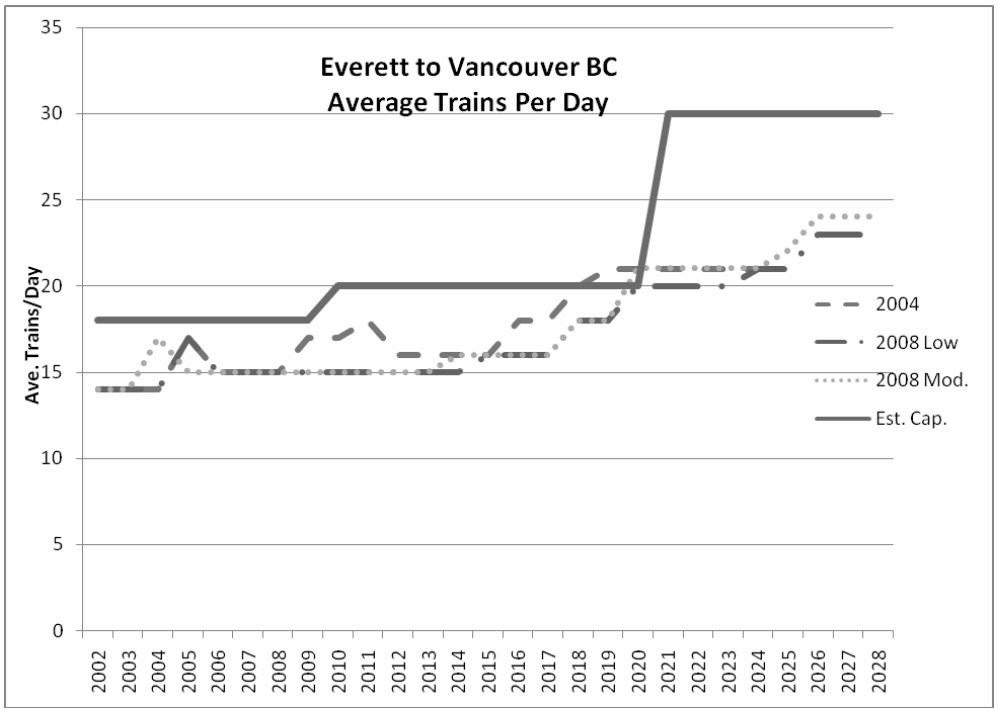
Beyond the improvements cited above, BNSF has no plans for capacity improvements on this segment beyond what passenger operations might demand.

The siding extensions and upgrades at Stanwood and Mount Vernon will allow more efficient meet/pass operations involving freight and passenger operations. Both siding extensions involve proposed closure of an existing at-grade crossing, so that the full length of both sidings can be used (Logen Road at Stanwood and Hickox Road at Mount Vernon). The new siding at Swift (Blaine) will allow additional capacity for freight train customs inspections while keeping the mainline open for other train operations, including passenger.

In addition to the above improvements, BNSF recently constructed a 10,000 foot clear siding at Colebrook, British Columbia. Colebrook is located where the British Columbia Railway (BCRC) Port Subdivision from Roberts Bank merges with BNSF's mainline to New Westminster and is approximately halfway between Swift and Brownsville. Prior to constructing the new Colebrook siding, BNSF had no meet/pass locations between the border and Brownsville.

The WPPA Rail Capacity Study – 2004 and the 2006 Statewide Capacity Needs Study had differing views of sustainable capacity on this segment. These differences appear to be due primarily to differing assumptions of train size and operating scenarios. Figure 5-11 represents the estimated increase in sustainable capacity that can be achieved through short- and long-term improvements.

Figure 5-11: Rail Corridor Capacity – Everett to Vancouver, BC



Source: Mainline Management

The siding improvements currently planned, coupled with the Colebrook siding construction, should provide this segment with sustainable capacity well into the future. Additionally, this segment should benefit from PTC because of the relatively long distances between sidings and control points.

East-West Routes Over the Cascade Mountains

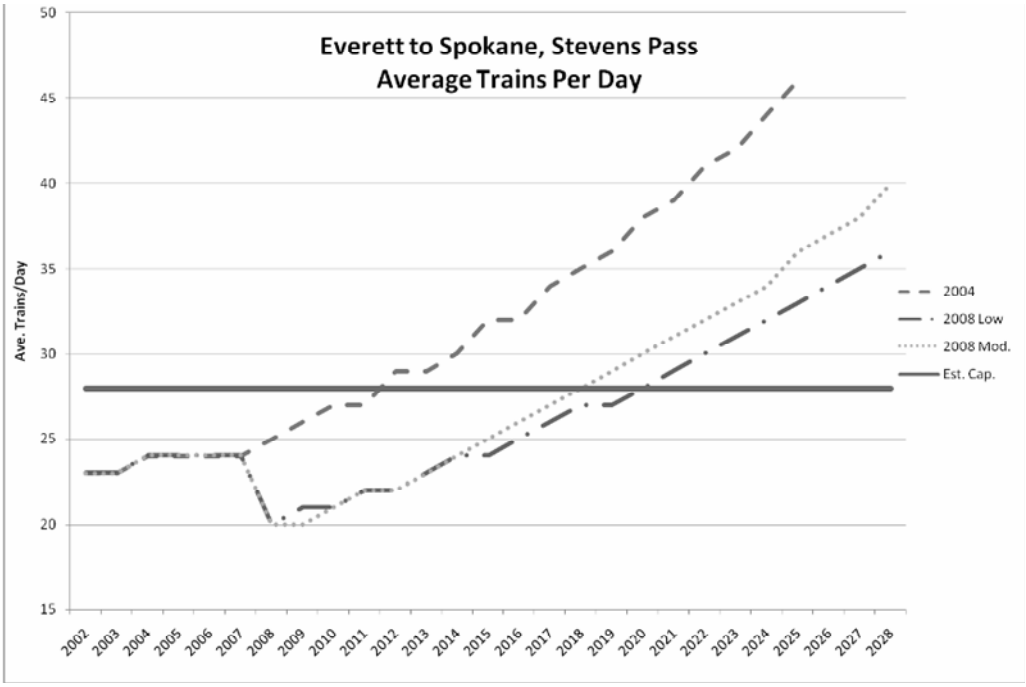
Everett to Spokane (Stevens Pass)

The capacity constraint on this segment is the throughput of the Cascade Tunnel across Stevens Pass due to the need to flush the air in the tunnel in between trains. It takes approximately 40 minutes to flush the tunnel following an eastbound train and 20 minutes for a westbound train. General consensus has long held that the maximum sustained capacity through the tunnel is 28 trains per day with short-term "surge" capacity of 30 to 32 trains per day.

The WPPA Rail Capacity Study – 2004 indicated that the capacity of Stevens Pass would be exceeded in the 2011-2012 timeframe given the growth projections at that time. However, because of the recent drop in the number of trains due to economic conditions, as well as to a change in the operating profile of trains, the capacity of this line segment will likely not be exceeded until 2016-2017 under the moderate growth scenario. If growth in train volumes continues to be slow for an extended period, then demand may not exceed capacity until approximately 2020. This estimate

will vary due a variety of factors: rate of economic recovery, tonnages by train, and limited impact from PTC. Figure 5-12 portrays the capacity demand consumption profiles of Stevens Pass at the 2004 projection, the 2008 low growth projection, and the 2008 moderate growth projection.

Figure 5-12: Rail Corridor Capacity – Everett to Spokane, Stevens Pass



Source: Mainline Management

BNSF's planned train characteristics are different than the assumptions used in the WPPA Rail Capacity Study – 2004. BNSF will now operate trains of up to 8,000 feet in length via the Pass so long as they do not exceed 5,500 tons without Distributive Power (DPU). In a DPU operation, one or more locomotives may be placed in the middle of a train and controlled by the lead locomotive. This puts less stress on the connections between cars, making it less likely that a train will break apart, and also provides faster and shorter braking. Using DPU, trains via Stevens Pass can increase to 7,000 tons. This results in fewer trains being needed to carry the same volume of cargo. Also, if a train exceeds 5,500 tons without DPU, it is operated via the Columbia River Gorge Route, which further reduces the number of trains using Stevens Pass.

Implementation of PTC is unlikely to have a dramatic affect on the capacity of this route because of the tunnel flushing requirements. It is possible that PTC, if directional flow of traffic is controlled closely, will allow an additional one to two trains per day to operate under sustainable conditions. However, that increase will not accommodate the long-term growth in demand for international containers, regardless of operating assumptions and economic recovery time frame.

BNSF has no plans to increase capacity on this route in its current 5-year capital investment program. There are a number of sidings that will accommodate 8,000-foot trains, on both sides of the tunnel. BNSF indicated that it has room to grow volume by several more trains per day before capacity at the Cascade Tunnel becomes an issue.

Several schemes to increase the capacity of the Cascade Tunnel have been discussed over the years, including boring new ventilation shafts or converting the line segment to use by electric

locomotives. Each of these options is prohibitively expensive, and the needed capacity is more likely to be added at Stampede Pass.

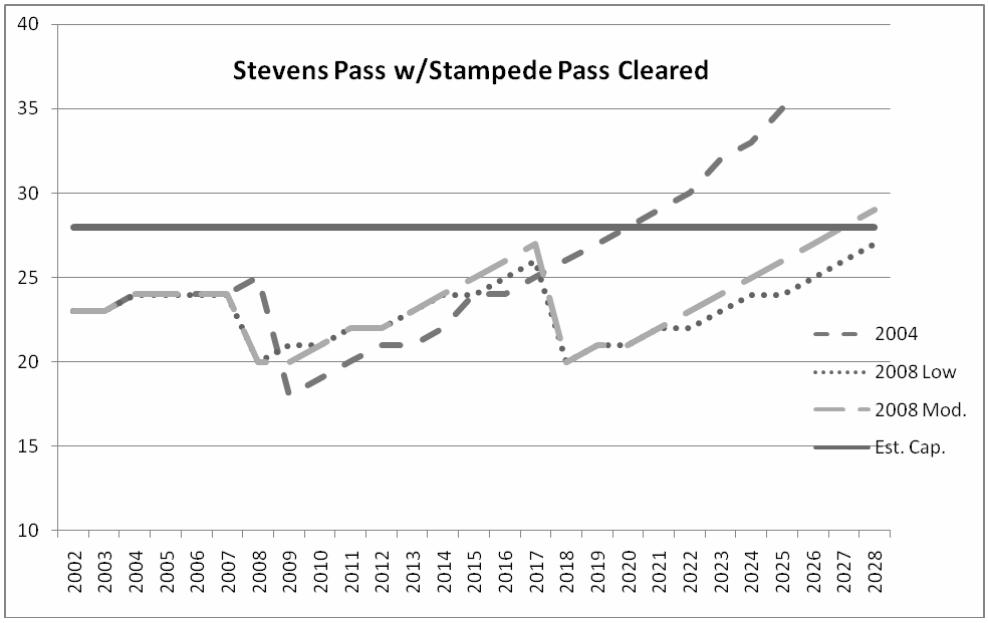
Impact of Stampede Pass on the Capacity of Stevens Pass

In the WPPA Rail Capacity Study – 2004 an analysis was performed on two scenarios that involved rerouting of traffic from Stevens Pass to Stampede Pass. The first anticipated the "clearing" of the Stampede Pass tunnel for double-stack rail cars in order to relieve capacity pressure on Stevens Pass. The second analysis involved directional running of trains between Spokane and Puget Sound, with westbound trains operating via Stevens Pass and eastbound trains operating via Stampede Pass. Figures 5-13 and 5-14 provide updated views for the two scenarios.

As the figures indicate, when needed, significant capacity over Stevens Pass can be realized by clearing the Stampede Pass tunnel. But, BNSF has no capital investment allocated for clearing Stampede Pass in its current 5-year plan.

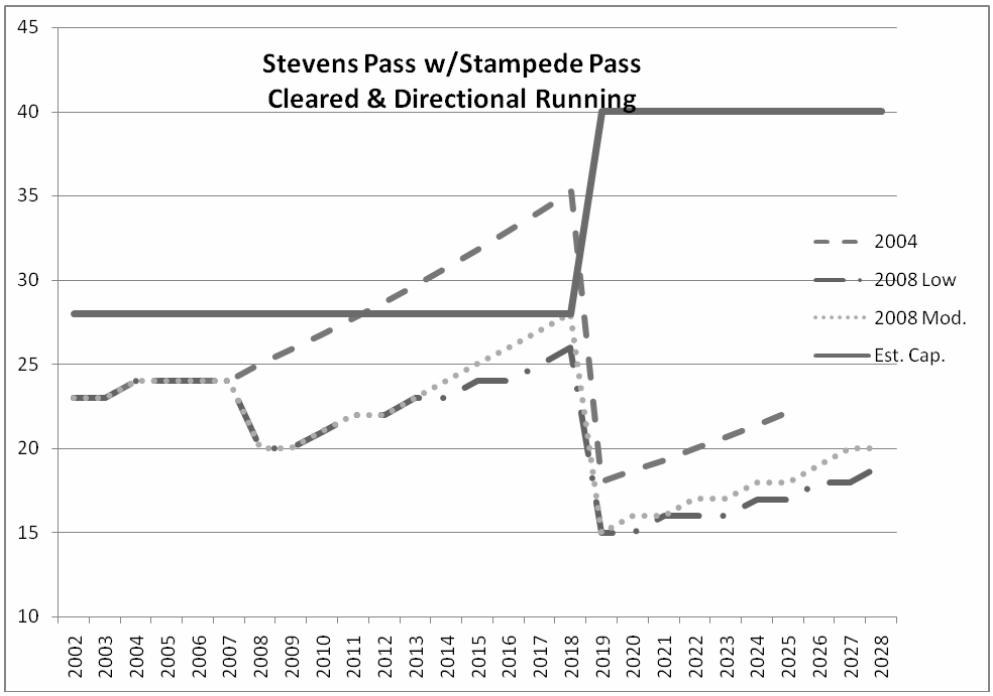
The issue of directional running is more problematic. Because routing trains over Stampede Pass requires that they go first to Pasco then back to Spokane, there is a need for additional crew, as well as operational issues. Re-opening the Ellensburg to Lind cut-off could alleviate some of these operational issues. However, the timing of these improvements is subject to various long-term issues that can't be forecast with any sense of confidence. The more significant question, from a capacity demand perspective, is when does growth begin to tax Stevens Pass capacity in an ongoing manner and how does BNSF choose to address the issue.

Figure 5-13: Rail Corridor Capacity – Everett to Spokane, Steven Pass With Stampede Pass Cleared for Double-Stack Containers



Source: Mainline Management

Figure 5-14: Rail Corridor Capacity – Everett to Spokane, Steven Pass With Stampede Pass Cleared and With Directional Running



Source: Mainline Management

Auburn to Pasco (Stampede Pass), Current Operations

BNSF has no funds allocated to improve Stampede Pass in its current 5-year capacity expenditure plans and is only operating a handful of trains per day via this route. Until the Stevens Pass route reaches capacity on an ongoing basis and rerouting via the Columbia River Gorge creates capacity problems on that route, BNSF is unlikely to make significant improvements to Stampede Pass.

BNSF is currently conducting an extensive test operating loaded grain trains via this route using mid-train helpers. In addition, BNSF has been testing the movement of coal from the Powder River Basin to the Westshore export coal facility at Roberts Bank. The loaded coal trains will be routed either via Stampede Pass, if the mid-train helper test looks promising, or via the Columbia Gorge and I-5 corridor. Empty coal trains from Westshore would be routed via Stevens Pass, if a slot is available, or via Stampede Pass. Empty grain trains from Puget Sound are routed via Stampede Pass.

Implementation of PTC on this route could effectively enhance sustainable capacity by providing a more "traditional" mainline segment that has effectively placed sidings and control points. It is unclear whether BNSF will be required to implement PTC on this segment since it does not currently involve passenger train operations. The trigger for requiring PTC implementation would be the handling of hazardous materials, as prescribed by legislation. BNSF would have the ability to route prescribed hazardous cars on other routes, particularly the Gorge Route, to bypass hazardous material movements between Pasco and Auburn.

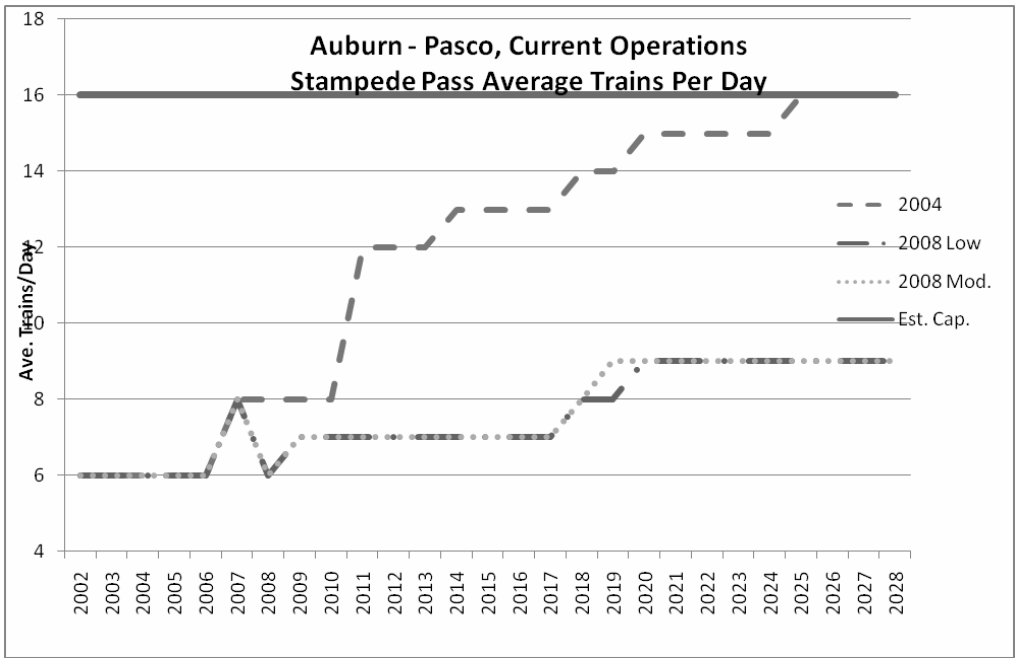
In the short term it is likely that Stampede Pass will continue to be used primarily for bulk unit trains in order to avoid the expense of PTC implementation on the route, at least until capacity constraints on Stevens Pass force the issue of improving Stampede Pass. In the short term,

implementation of PTC on the Stampede Pass route would create additional capacity where the existing sustainable capacity is not being used.

As discussed above, for the BNSF, directional running on this corridor in conjunction with Stevens Pass is not realistic under projected conditions unless the Ellensburg to Lind cut-off is constructed. The logistics problems associated with crew and locomotive rotations involving a Spokane to Everett/Seattle westbound movement and an Auburn to Pasco/Spokane eastbound movement are significant, and the BNSF is not expected to pursue this option in the foreseeable future.

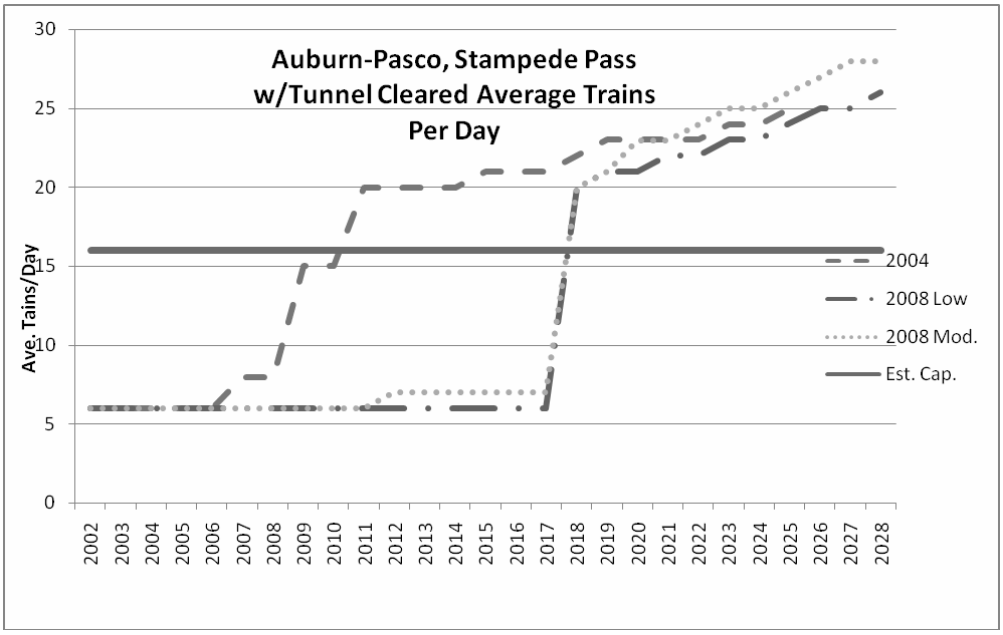
When BNSF decides to improve this route for increased train operations, the signal system will likely have to be upgraded to full CTC. PTC at that point would be an obvious alternative to the investment in an expanded signal system. The three scenarios are presented in Figure 5-15, Figure 5-16, and Figure 5-17.

Figure 5-15: Rail Corridor Capacity – Auburn to Spokane
Current Operations



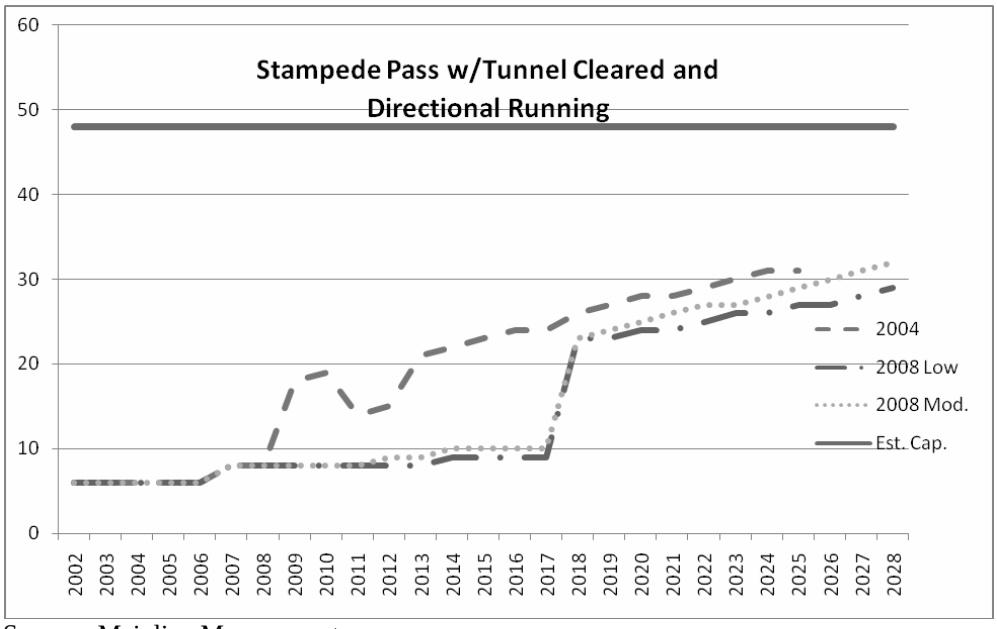
Source: Mainline Management

Figure 5-16: Rail Corridor Capacity – Auburn to Spokane With Tunnel Cleared



Source: Mainline Management

Figure 5-17: Rail Corridor Capacity – Auburn to Spokane With Tunnel Cleared and With Directional Running



Source: Mainline Management

Potential Light Density Rail Line Abandonments

As illustrated in the Figure 5-1 on Page 134, there are nearly 30 short-line railroads operating in Washington. The majority of these railroads operate light density lines that were abandoned by the Class I (mainline) carriers. They are located throughout the state and play a critical role in moving a wide variety of products, including agricultural products, frozen foods, lumber, gravel, and petroleum products. Often locally owned and operated, many short-line railroads in Washington State keep hundreds of small businesses and communities connected to the national mainline rail system.

Many of these short lines were abandoned by the Class I railroads because the mainline carriers could not make a profit operating these light density lines. Nearly every short-line railroad began its existence with track that had received little investment under previous owners. Whether they are municipally or privately held, many short lines are in need of infrastructure funding for rehabilitation or improvement.

These existing lines present an opportunity to Washington State. In many cases, improvements for the state's short lines involve improvements to existing infrastructure, rather than capacity expansion improvements that involve more significant environmental issues. They should therefore be able to move more readily from planning to construction. A review of the most recent WSDOT short-line funding proposals indicates that most of these projects involve improvements to existing infrastructure. In many cases these improvements involve increasing track tonnage maximums from 263,000 pounds per car to 286,000 pounds per car to meet Class I railroad requirements.

Upgrading track to handle the higher car weights may make economic sense, if it results in an increase in the amount of traffic on a line. However, if cargo volumes remain the same, but the number of carloads decreases due to the higher loading, the benefit is less clear. This is especially the case if the contract between the short-line operator and the Class I railroad is on a per-car basis, in which case the reduced number of cars would result in reduced revenue.

Some short lines are more successful than others, and the viability of each depends on its own particular circumstances. Those short lines that have faced ongoing problems with cash flow and capital for infrastructure improvements are the ones most at risk. WSDOT has been able to assist many of the short lines with project funding, but these infrastructure investments may not be sufficient to make each short line economically viable. However, even if lines are marginal, there may be a compelling state interest in supporting these lines in order to reduce truck traffic or to maintain jobs, among other reasons that serve the public interest.

Other Issues

Joint Operations in Washington

The Canadian National Railway (CN) and Canadian Pacific Railway (CP), in conjunction with BNSF, BCRC and Southern Railway of British Columbia (SRY), have continued to look for opportunities to improve rail service in the Greater Vancouver service area while reducing operating costs. The CN and CP compete for cargoes much as the UP and BNSF do in the U.S., but they have been much more willing to enter into joint operating agreements. The same willingness has not been shown by BNSF and UP to create operational efficiencies through co-production in

Washington. However, there are also fewer opportunities in Washington to increase capacity through co-production.

In the Greater Vancouver area, the CN and CP have parallel and competitive routes into and out of the region. In contrast, BNSF owns or controls most of the rail lines leading into the Puget Sound area. The exception is between Tacoma and Tukwila, where the UP operates its own line. It is in this stretch between Tacoma and Tukwila that opportunities exist for joint operations between the BNSF and UP that would benefit both of the railways as well as the Puget Sound ports

Under the FAST II project a detailed analysis was developed for potential joint operations between Tacoma and Tukwila, with the goal of improving port access and increasing general freight mobility. The clear conclusion was that expanded co-production between the Tacoma (at the Reservation Interlocking) and the joint interlocking at Tukwila (Black River Interlocking) could provide expanded capacity for Puget Sound ports. This conclusion has been supported by subsequent analysis.

The UP and BNSF have parallel mainline routes between the Reservation and Black River Interlockings, with UP running along the west side of the Kent Valley and BNSF along the east side. The general concept of the co-production analysis is for BNSF traffic moving to and from the Tacoma Tideflats to use the UP line between Tacoma and Tukwila, and for UP traffic between Tacoma and Tukwila to use the BNSF line if it is not headed to or from the UP yard in Fife.

There are few other opportunities in the state for co-production because there are few other areas where the two mainline railroads operate parallel lines. In fact, the BNSF owns most of the primary mainline rail routes through the state. Other than the Tacoma to Tukwila line, the only other mainline route owned by the UP in Washington runs between Spokane and Wallula, just south of Pasco. The other potential for co-production is between Spokane and Sand Point, Idaho, the location of the proposed "Bridging the Valley" project.

It should be noted that the BNSF and UP do have existing local service to customers agreements in the Seattle area (Zone Switching Agreements). Under those agreements one railway provides the service on behalf of both to individual industries in a designated industrial zone.

Port Connectivity Issues

Nearly all of Washington's deepwater ports are located adjacent to the I-5 corridor, or are on short-line railroads that branch off the I-5 corridor. As a result, rail connectivity issues for the ports and capacity issues on the I-5 corridor are necessarily tied. Along the corridor there are five main areas where mainline capacity needs and connectivity issues intersect, including: Vancouver, WA, Kalama to Longview, Centralia, Tacoma, and Seattle. Each of these is examined in more detail below.

Vancouver, WA is a major point of congestion in Washington's rail system, for several reasons: the I-5 corridor ties to the Columbia Gorge rail corridor there, Port of Vancouver rail traffic moves through the area, and the BNSF operates a yard in Vancouver. East-west traffic crosses north-south traffic at-grade, while local traffic moving at slow speeds consumes mainline capacity, slowing the more than 100 trains that pass through the Vancouver rail yard every day. Two projects are planned or under construction to alleviate these conflicts.

The first of these projects is the Vancouver Bypass. The Vancouver Bypass will provide a new mainline track around the Vancouver Yard that allows through trains to avoid moving through the

yard. It also provides a grade separation between West 39th Street and the yard, improving vehicle and pedestrian safety. Construction of the siding tracks along the west side of the rail yard began in January 2009, and construction of the 39th Street Bridge is expected to begin in early 2009, to be completed by mid-2011. Full funding for the remaining rail elements of the plan is not yet in place.

The Port of Vancouver Freight Access Project would separate port traffic from mainline traffic by grade separating the primary route into the port. This would reduce the number of trains that need to cross over the mainlines. With port-related traffic exiting the Columbia Gorge route farther east, the project would also improve flow through the Vancouver Terminal area. Finally, the new configuration of yard tracks and leads within the port will increase the ability of the facility to handle longer trains.

In the ten-mile stretch between Kalama and Longview, local traffic also consumes mainline capacity in two ways. First, grain trains exiting or entering the mainlines at Kalama must move relatively slowly on or off of the main, which delays through traffic moving along the mainline. Second, local operations working from the Longview Junction rail yard must make some moves on the mainline, and these also move relatively slowly. The plan to alleviate the problems in this area involved construction of a third mainline between Kalama and Longview. Construction is planned to begin in the 2013-2015 biennium and to be completed by mid-2017.

At Centralia, the short-line railroad serving the Port of Grays Harbor, the Puget Sound and Pacific (PSAP), branches off of the BNSF I-5 corridor mainline. The Tacoma Rail Mountain Line parallels the I-5 corridor mainline through Centralia, crossing the PSAP line at Blakeslee Junction. The Tacoma Rail and PSAP/Centralia project will reconfigure Blakeslee Junction to provide Tacoma Rail access on the PSAP between Blakeslee Junction and the BNSF mainline, and will reconfigure and upgrade the PSAP line between Blakeslee Junction and the main. Once complete, the Tacoma Rail line through downtown Centralia will be removed. Further phases of the project will add rail capacity in Centralia, a second connection between PSAP and Tacoma Rail in Grand Mound, and additional storage track. Funding has not yet been secured for the full project, with only partial funding for the Blakeslee Junction to mainline currently in place.

In Tacoma, train movements for BNSF and UP between the mainlines, yards, and port terminals is somewhat inefficient. Two proposals to mitigate this have been considered in the past. The first is construction of a new rail bridge linking Bullfrog Junction on the Tideflats to the mainlines at Reservation Interlocking. The second is implementation by BNSF and UP of co-production between Tacoma and Tukwila.

Under the co-production proposal, UP port traffic to and from the south would use the BNSF line to connection through Bullfrog Junction, while BNSF port traffic to and from the south would use the UP connection at Reservation Interlocking, and would also use the UP main between Tukwila and Reservation Interlocking. To this point, the railroads have not agreed to such an arrangement.

In Seattle, neither the BNSF nor the UP has a direct route between the mainlines and on-dock intermodal facilities. BNSF international container traffic first moves through the Seattle International Gateway (SIG)/Stacy Yard, which increases transit time. The UP line to the on-dock facilities is essentially a switching lead that extends through the Argo Yard, which significantly impacts operations at Argo. In addition, intermodal trains cross East Marginal Way at-grade, creating long vehicle delays.

One project designed to ease part of this problem is the East Marginal Way Grade Separation. This project will construct an overpass that routes vehicle traffic up and over railroad tracks just

south of the Spokane Street corridor. When completed in late 2009, the project will eliminate traffic delays on East Marginal Way caused by trains crossing at-grade.

Another concept for improving rail access to Port of Seattle facilities is the Duwamish Rail Corridor, which would essentially create a double track connection between the UP Argo Interlocking and the Harbor Island line using one UP yard track and a BNSF track. However, this project has not moved beyond initial discussions.

In Everett, rail access is not currently an issue. In the future the BNSF may construct the Bayside Bypass route, but this project is unlikely to cause access problems to port properties. The single-track Everett Tunnel, located through Everett on the mainline south of the convergence of the Stevens Pass mainline and the mainline to Blaine, is handling an increasing number of passenger trains, which impacts freight capacity through the tunnel. The proposed Bayside Bypass would extend a line from Delta Junction down the Bayside industrial track and connect back into the Seattle mainline at Everett Junction.

In Bellingham, the city and Port of Bellingham are developing plans to convert the former Georgia Pacific industrial site into a mixed use waterfront development. As part of this project, a sharp curve in the BNSF Railway's mainline track near the site will be removed and the tracks moved further to the east. The relocated tracks will allow passenger and freight trains moving through the area to travel at slightly higher speeds.

In Pasco, the Port of Pasco is making a series of improvements to the network of railroad tracks that serve the Big Pasco Industrial Center. These improvements include replacing older track to handle heavier and longer trains, container terminal tracks along the Columbia River, road/rail crossing improvements, and a second connection to the BNSF Railway mainline. Three of five phases have been completed, with Phase 4 slated for construction in 2009.

In addition to these projects, WSDOT works closely with port districts to improve freight rail access throughout the state and to help Washington's business community gain better access to rail transportation. WSDOT is the state agency that administers state and federal transportation funds that are spent on rail projects in Washington State. Examples of past projects have included purchases of grain hopper cars, rehabilitation of short lines, and purchase of branch lines, as well as funding of local projects.

Conclusions

It is clear that the current state of the U.S. and worldwide economy has had a significant negative impact on business levels in the state of Washington. That impact has and is being felt by the state's ports and the transportation modes it relies on to handle import/export commodities. Rail volumes have not been exempt from this circumstance, whether in Washington State or over the North American rail network.

As a result, train growth projections from 2008 looking forward are significantly different than those generated in previous analyses due to

- Lower cargo volumes of all types.
- Longer train lengths.
- Different train routing scenarios.
- Lower passenger train forecasts short- to mid-term.

Washington State should continue to aggressively pursue rail capacity expansion, mainline or short line, where the longer-term interests of the state are clearly identifiable and the timelines for

investment and construction are lengthy. Following is a prioritized list of rail improvement projects that are needed in the short- to mid-term. Each of these improvements should be targeted for implementation or completion within the next eight years, or by the end of 2017. Given the level of planning and funding required to complete these improvements within that timeframe, emphasis needs to be placed on these projects now.

1. **Vancouver (Washington) Bypass.** The Vancouver Bypass is a fundamental component in improving freight and passenger train flows through the Vancouver Terminal. Projected completion in 2012.
2. **Point Defiance Bypass, Tacoma to Nisqually**. Several recent studies have demonstrated that train volumes through the single-track Nelson-Bennett and Ruston tunnels are likely to exceed capacity in the foreseeable future. The Point Defiance Bypass will not only provide a superior service route for passenger operations between Portland and Seattle, but will provide relief for freight and passenger conflicts that will continue to grow over time. Scheduled completion in 2012.
3. **Third mainline between Kalama and Longview** (Amtrak *Cascades* Mid-Range Plan Option 3). In order for the BNSF allow an increase in passenger train volumes between Portland and Seattle, this improvement is a fundamental component. It is a key component for mitigating the conflicts that occur between freight and passenger operation around the Kalama and Longview terminal areas. Scheduled Completion in 2014.
4. **Port of Vancouver (Washington) Freight Access Project**. Rail movements between the BNSF yard, Port of Vancouver industries, and the mainline create significant conflicts and congestion. In conjunction with the Vancouver Bypass, this improvement provides a significant improvement in rail traffic flows through the Vancouver Terminal. Scheduled completion in 2017.

The above four projects represent the greatest opportunity for expansion of capacity in Washington, providing for expanded intercity passenger train operations and protecting freight service integrity. These four projects should be pursued for completion as soon as practical. The cost is high but the benefits in capacity, service and growth will be realized over many years. This is not adding a car to a train to increase capacity, it is allowing trains to be added to the network to meet capacity demand. These four items should be considered as co-mingled requirements for capacity improvement on the I-5 supporting passenger growth and rail capacity conflict mitigation.

5. **Complete siding extensions at Mount Vernon and Stanwood, construct new inspection siding at Swift (Blaine).** While the line segment between Everett and Blaine/Vancouver, BC is not particularly constrained today, the siding improvements currently in planning for this segment will greatly reduce existing conflicts between BNSF freight operations and intercity passenger trains, and will support growth in cross-border passenger trains. In conjunction with the siding extensions at Mount Vernon and Stanwood, a road crossing that bisects each siding should be closed so that the full extent of the additional siding capacity at both locations can be used without conflicting with public crossings.
6. **Blakeslee Junction Improvements, Centralia**. The initial phases of this project would re-align the connection in Centralia between the BNSF I-5 mainline and the Puget Sound and Pacific (PSAP) line serving the Port of Grays Harbor, and would connect the

Tacoma Rail Mountain Line to the BNSF via the PSAP between Blakeslee Junction and Centralia. Later phases would add another connection between Tacoma Rail and PSAP, add storage capacity, and add capacity to BNSF at Centralia.

7. **High Speed Crossover Plan, Nisqually to Centralia.** In conjunction with the third main between Kalama and Longview and the Pt. Defiance Bypass, the flexibility offered by this set of improvements will enhance freight and passenger capacity on the north end of this segment.
8. **East Marginal Way Grade Separation and Duwamish Rail Corridor, Seattle**. Connectivity issues between the mainlines in Seattle and port facilities impact capacity in the area. This is especially true for the Port of Seattle container terminals west of the Duwamish Waterway (i.e., T-18 on Harbor Island, and T-5 in West Seattle). This project will create the opportunity for direct train movements for BNSF and UP between port facilities and the mainlines. In the long term, a return to sustained and robust import/export growth will likely increase the demand for a more efficient rail connection between on-dock port terminals and the mainlines.
9. **Bullfrog Junction Realignment, Tacoma**. As has been detailed in previous studies, train movements for BNSF and UP between the mainlines and yards and Port of Tacoma terminals is somewhat convoluted and inefficient. Two proposals to mitigate this have been considered in the past. The first is construction of a new rail bridge linking Bullfrog Junction on the Tideflats to the mainlines at Reservation Interlocking, and the second is implementation by BNSF and UP of co-production between Tacoma and the Black River Interlocking in Tukwila.

There are other longer-term improvements, however, that have been discussed and considered in the past. These improvements, while not on the radar for early consideration given the current rail capacity demand, should not be dismissed as possibilities over the long term.

1. **Vancouver to Kelso—*Cascades* Mid-Range Plan Option 4**. Completion of the full extent of 3rd mainline between Martin's Bluff and Rocky Point is going to be necessary to introduce the full range of passenger train operations between Portland and Seattle. Option 3 (above) provides the base for increased passenger train volumes on this segment, but Option 4 provides the basis for full long-term passenger volumes on this corridor.
2. **Clearing Stampede Pass for Double-Stack Rail Cars.** BNSF has again indicated for this study that it will not pursue investment to clear Stampede Pass for double-stack rail cars until it is apparent that capacity demand on Stevens Pass cannot reasonably and consistently be met. Prior to making a decision on clearing Stampede Pass, BNSF will also likely assess the ability of the Columbia River Gorge route between Vancouver and Spokane to handle some of the overflow from Stevens Pass.
3. **Directional Running—Stevens Pass and Stampede Pass**. BNSF has indicated that this option is not viable under current operating and competitive parameters, whether Stampede Pass is "cleared" for double-stack trains or not. Asset and resource utilization issues (locomotives, crews) makes this project difficult to visualize without other significant capacity and operational changes associated with use of Stampede Pass.
4. **Construct the Lind to Ellensburg Cut-Off.** The reopening of the old Milwaukee Rail line between Lind and Ellensburg has been a subject of discussion for numerous years as

a mainline cut-off between the Stampede Pass route and Spokane. In order to implement directional running between Puget Sound and Spokane, the Lind to Ellensburg cut-off would need to be place, making it possible for the BNSF to operate trains between Spokane and Puget Sound with one crew each way. Locomotive utilization issues would also be mitigated. This potential project should remain as a long-term option as, in conjunction with clearing Stampede Pass, east-west mainline capacity within the state would potentially be improved exponentially.

5. **"Bridging the Valley," Spokane to Athol**. The proposal to consolidate UP and BNSF mainline operations on BNSF's mainline corridor between Spokane and Athol has been rejected by BNSF. As the segment analysis above indicates, BNSF likely has sufficient current and future capacity to accommodate growth demand into the foreseeable future. Projecting capacity demand requirements well into the future, however, is difficult, as clearly demonstrated by the changes that have occurred since the 2004 and 2006 rail capacity studies. Projects such as this could become more attractive in the future.

A return to vibrant and sustained growth could begin to tax mainline capacity in the state, but is not likely in the short term. Longer term, strategic projects such as the Lind to Ellensburg cut-off, clearing Stampede Pass and "Bridging the Valley" may well become desirable in the future and should not be dismissed as potential capacity improvements to meet the long-term requirements to support efficient rail service in the state.